

**Table 7.** Each dimension describes the results of the normality test of statistical and measurement items

Latitude	Measurement item	M	SD	Skewness	Kurtosis	Total M	Total SD
Operator	D1	3.81	1.137	-0.894	0.22	3.8524	0.93959
	D2	3.89	1.16	-1.035	0.342		
	D3	3.85	1.236	-1.118	0.361		
	D4	3.86	1.14	-1.004	0.391		
Job	O1	3.87	1.166	-0.995	0.231	3.846	0.9441
	O2	3.9	1.152	-1.099	0.555		
	O3	3.84	1.188	-0.979	0.181		
	O4	3.82	1.216	-0.947	0.082		
	O5	3.8	1.222	-0.961	0.031		
Environment	B1	3.82	1.183	-0.927	0.129	3.8037	0.95559
	B2	3.87	1.177	-0.953	0.056		
	B3	3.78	1.145	-0.855	0.086		
	B4	3.74	1.187	-0.837	-0.08		
Equipment	F1	3.77	1.218	-0.938	0.093	3.8195	0.97379
	F2	3.8	1.19	-0.894	-0.032		
	F3	3.91	1.185	-0.971	0.131		
	F4	3.8	1.148	-0.838	-0.058		
Enterprise management	M1	3.88	1.153	-1.067	0.489	3.876	0.9058
	M2	3.88	1.116	-1.082	0.598		
	M3	3.93	1.137	-0.986	0.222		
	M4	3.87	1.101	-1.048	0.634		
	M5	3.82	1.167	-0.925	0.16		

According to the analysis results in **Table 7**, it can be seen that the mean score (M) of each variable is between 3 and 4, and the score range of the mean score (M) is positive between 1 and 5. Therefore, it can be seen that the cognitive level of the subjects in this study on the influencing factors of online work fatigue in the manufacturing industry is above medium, which proves the authenticity and validity of the data.

The normality test of each measurement item is tested by skewness and kurtosis. According to the standard proposed by foreign scholars, the absolute value of the skewness coefficient is less than 3, and if the absolute value of the kurtosis coefficient is less than 8, then the data can be considered to meet the requirements of approximate normal distribution<sup>[20]</sup>. According to the analysis results in **Table 7**, the absolute values of skewness and kurtosis coefficients of each measurement item in this study are within the standard range, so it can be proved that the measurement data conforms to the characteristics of normal distribution, and the output data of the fitted model can be used for further analysis.



## 5. Conclusion and suggestions for improvement

### 5.1. Conclusion

After a series of confirmatory factor analyses, the data output results of the fitted model have high reliability, which can reflect the load size of various influencing factors that cause the work fatigue of online workers in the manufacturing industry to a certain extent, and the larger factor load means that it is more likely to cause the work fatigue. The factor loads of specific influencing factors are summarized in **Table 8**.

**Table 8.** Summary table of influencing factors and factor loads

First-order factor	Weight	Second-order factor	Weight	First-order factor	Weight	Second-order factor	Weight
D	0.61	D1	0.689	F	0.71	F1	0.696
		D2	0.767			F2	0.763
		D3	0.758			F3	0.798
		D4	0.696			F4	0.766
O	0.69	O1	0.716	M	0.71	M1	0.732
		O2	0.725			M2	0.767
		O3	0.742			M3	0.739
		O4	0.727			M4	0.703
		O5	0.76			M5	0.756
B	0.76	B1	0.741				
		B2	0.772				
		B3	0.723				
		B4	0.733				

The influence weight of the working environment (B) is 0.76, which has the largest influence on online work fatigue, and the influence of dust (0.772) is particularly obvious.

The influence weight of operating equipment (F) is 0.71, indicating that it has a greater impact on the fatigue of online workers, and the coordination of machinery and equipment (0.798) has the greatest impact.

The influence weight of enterprise management (M) is 0.71, which is roughly the same as the influence of operating equipment on job fatigue, among which salary and welfare (0.767) have the most significant influence on job fatigue.

The influence weight of the job itself (O) on job fatigue is 0.69, in which job accuracy (0.76) has the greatest influence on fatigue degree.

The influence weight of operator (D) is 0.61, and the influence degree is relatively small compared with other factors, among which work pressure (0.767) has the most serious impact on work fatigue.

### 5.2. Suggestions for improvement

Based on the analysis of the above results and the theory of human factor engineering, the following improvement measures are put forward to reduce work fatigue as much as possible.

### **5.2.1. Improve the working environment**

The primary task of improving the working environment is to reduce the dust concentration in the air, increase the number of dust collection equipment without hindering work safety, and the most critical thing is to equip each staff with professional dust prevention equipment, such as dust masks, dust masks, etc. At the same time, strengthen site management to prevent material accumulation, maintain the cleanliness of the work site by increasing cleaning personnel and organizing regular cleaning to prevent the occurrence of dirty and disorderly phenomena; Improve the ventilation, noise reduction, and temperature control system to ensure the working comfort of workers, through the above measures to avoid the maximum extent due to the working environment problems caused by fatigue.

### **5.2.2. Regular maintenance and replacement of operating equipment**

The enterprise should organize training regularly to ensure the proficiency and coordination of workers in operating the machine, and reduce the occurrence of operation fatigue and even production accidents caused by operation problems; Design equipment maintenance point checklist, carry out equipment inspection and maintenance regularly, and prevent equipment failure in advance; Timely upgrade and iteration of outdated equipment to avoid additional work burden caused by equipment function mismatch, and promote man-machine system integration.

### **5.2.3. Improve the enterprise management system**

A good enterprise management system should be in line with “making the best use of people, making the best use of things, matching people”, so that reward and punishment are clear, and benevolence and power are applied, which can be started from the following aspects: first, formulate a reasonable salary system and scientific incentive means, appropriately increase welfare benefits, and improve work enthusiasm. The second is to fully understand the skills of workers, organize skills assessments, and ensure that each worker can be assigned to the most suitable post. The third is to develop a scientific overtime system to ensure that workers have enough rest and sleep time, avoid workers due to lack of rest caused by operational errors, and reduce work fatigue. Fourth, set up an open and transparent promotion campaign mechanism to resist the existence of nepotism.

### **5.2.4. Formulate reasonable operating systems and norms**

On the one hand, it is more beneficial to arrange several short breaks in the working process of workers than a long rest. Enterprises arrange the rest time and number of workers according to the work intensity of different positions, to ensure stable efficiency and alleviate work fatigue. On the other hand, the establishment of standard operating instructions, through the experience accumulation of experienced workers and the summary of technical backbone, to develop clear and understandable standard operating instructions, is of great significance for reducing bad working posture, improving production efficiency, and reducing work fatigue.

### **5.2.5. Pay attention to the health of employees' lives**

The physical state of workers has an obvious influence on the production of work fatigue, among which work pressure is the first. First of all, enterprises should formulate production plans scientifically to avoid the work pressure on employees due to the heavy production tasks. Secondly, the enterprise can regularly investigate the mental state of employees through questionnaires and other forms. If necessary, psychological counseling can be conducted to ensure the mental health of employees. Regular medical examinations are organized for employees

and they are always concerned about their physical health. Finally, enterprises can regularly organize team building, staff sports, and other recreational activities to let employees relieve pressure.

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# Analysis of the Current Situation and Countermeasures for Qinhuangdao City's Active Response to Population Aging and the Construction of Elderly Care Service System

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**Abstract:** With the continuous development of global technology and the improvement of medical standards, the aging of the population is an inevitable consequence. In recent years, the decline in birth rate and mortality rate has accelerated the proportion of the aging population in China. However, public elderly care institutions still mainly focus on providing basic support, while private elderly care institutions face issues such as incomplete infrastructure, weak professional service capabilities in rehabilitation nursing and emotional support, insufficient follow-up funding, management and operation mechanisms that need improvement, conflicts with traditional ideologies, and high elderly care costs. In recent years, various regions across the country have actively explored new models of socialized home-based elderly care services. However, due to deviations in social awareness and the weakness of professional service teams, it is more important to fully leverage the government's role in leading socialized home-based elderly care services.

**Keywords:** Aging of population; Pension services; Qinhuangdao City

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## 1. Research background and significance

### 1.1. Research background

In the context of developing healthy aging, the issue of population aging brings new challenges to China's socio-economic development and transformation<sup>[1]</sup>. Simultaneously, it presents new opportunities for the elderly industry to drive economic growth and stimulate consumption. Since the implementation of the "14th Five-Year Plan", various regions across the country have taken multiple measures to seize the "window period" and actively address population aging. With the continuous deepening of the coordinated development strategy for Beijing-Tianjin-Hebei, the cross-regional allocation of resources has created new opportunities for the development of

elderly care services. As a tourism and resident city, Qinhuangdao, Hebei Province, is not only a famous summer resort in China, but has also been listed as a pilot city for comprehensive reform of the national elderly care service industry, comprehensive innovation in the national rehabilitation assistive device industry, community rental services of rehabilitation assistive devices, and the special action of nationwide city-enterprise linkage for inclusive elderly care <sup>[2]</sup>. Therefore, Qinhuangdao has unique advantages in developing the elderly care industry.

## **1.2. Research significance**

### **1.2.1. Qinhuangdao faces new challenges in the construction of its elderly care service system**

Like most cities in China, Qinhuangdao faces new challenges as the demand for elderly care services continues to increase. Firstly, there is insufficient dynamism in the coordinated development of home-based and community-based elderly care, and social capital investment in elderly care services is not yet sufficient to achieve profitable development. Secondly, the target population is still focused on elderly individuals with disabilities, semi-disabilities, or injuries that burden family caregivers, leaving a gap in meeting the diversified needs of elderly care services. Thirdly, the quality of service provided by elderly care institutions varies, and the overall service level needs to be improved <sup>[3]</sup>. Fourthly, the needs of rural elderly individuals for daily care, health management, emotional support, and other services are not yet effectively met.

### **1.2.2. The importance and impact of developing the elderly care industry in Qinhuangdao**

With the deepening implementation of the coordinated development of Beijing-Tianjin-Hebei, Qinhuangdao fully utilizes its comparative advantages in location and ecology. It insists on developing both elderly care undertakings and industries simultaneously, fully opens up the elderly care service market, encourages and guides Beijing's elderly care projects to extend their layout to the city, and actively promotes the integrated development of elderly care in Beijing-Tianjin-Hebei. Firstly, the local government has applied to include Qinhuangdao in the scope of the extension layout of elderly care projects around Beijing, effectively enhancing the influence of Qinhuangdao's elderly care industry in the Beijing-Tianjin region. Secondly, it explores and amplifies the superimposed policy advantages of the Beidaihe Life and Health Industry Innovation Demonstration Zone, continuously and efficiently promoting the accelerated transformation and development of training and treatment institutions. According to the local civil affairs department, as of now, 17 high-end elderly care institutions, such as Ping'an Qinkang Yiyang, have been put into operation as health and wellness projects for the transformation of training and treatment institutions. Qinhuangdao's characteristic elderly care service system, which coordinates home and community institutions and combines medical and health care, has basically been formed <sup>[4]</sup>. Thirdly, in 2023, Qinhuangdao also applied for funding support for two elderly care institution renovation and upgrading projects, namely the Hebei Ping'an Health Group's Beidaihe Comprehensive Health and Wellness Project and the Changli County Centralized Supply Center (public-private partnership) renovation and upgrading project, with a total investment of over 139 million yuan. This article summarizes and refines the problems and reasons faced by local elderly care services through interviews with government departments, institutions, communities, and the elderly, providing guidance for the next step of elderly care service work in Qinhuangdao and also providing a reference for similar regions to carry out elderly care services.



## 2. Current status and main issues of elderly care service system construction in Qinhuangdao City

### 2.1. Analysis of population aging trends in Qinhuangdao City

According to the results of the “Seventh National Population Census”, the permanent population of Qinhuangdao is 3.1369 million, of which 732,600 are aged 60 and above, accounting for 23.36%; 509,100 are aged 65 and above, accounting for 16.23%<sup>[5]</sup>. The proportion of the population aged 60 and above and 65 and above is 4.66% and 2.73% higher than the national average, respectively. By comparing the results of the three population censuses in **Table 1**, it can be seen that the population aged 65 and above has increased from 215,600 in 2000 to 509,100 in 2020, more than doubling in number. At the same time, the proportion of the population aged 65 and above has also increased from 7.83% to 16.23%. This indicates that the number of elderly people in Qinhuangdao is increasing year by year and showing an accelerated upward trend. Assuming that the birth rate and death rate remain relatively unchanged from current levels, it is estimated that over the next 30 years, the proportion of the population aged 65 and above in Qinhuangdao’s permanent population will exceed 25%. The continuous expansion of the elderly population would result in the increasing number of elderly people with disabilities and dementia, the increasing burden on society and families, and the changing demand for elderly care services, medical security, and health services.

**Table 1.** List of Qinhuangdao City’s aging population

Year	Permanent city population (Person)	Number of people aged 60 and above	The proportion of the population aged 60 and above	Number of people aged 65 and above	The proportion of the population aged 65 and above
2000	2753962	312942	11.36%	215603	7.83%
2010	2987605	432948	14.49%	282550	9.46%
2020	3136879	732638	23.36%	509121	16.23%

Note: Data source: Fifth, sixth, and seventh national population censuses in Qinhuangdao City

### 2.2. Current status of elderly care service system construction in Qinhuangdao

In recent years, Qinhuangdao has continuously strengthened the foundation of elderly care services, addressed shortcomings and weaknesses, and focused on building an elderly care industry brand with unique characteristics of Qinhuangdao, featuring “healthy aging and ecological aging”, to high-quality meet the demand for elderly care services. As of the end of 2022, there were 62 elderly care institutions in the local area with a total of 10,171 beds, and nursing beds accounted for 55% of the total. 61 community home-based elderly care service centers have been established. There are 192 daycare service facilities in 168 coded communities across the city, achieving full coverage, full operation, informatization, and remote monitoring and management of community daycare service facilities, which has always been in a leading position in the province.

### 2.3. Main issues in the construction of the elderly care service system in Qinhuangdao

#### 2.3.1. Low overall occupancy rate of elderly care service institutions

The occupancy rate of local elderly care institutions is less than 35%. Some institutions have a “shortage of beds”, while others have “vacant beds”, indicating unreasonable resource allocation. For example, some public nursing homes have outdated facilities, poor food quality, and a poor living environment. Mid-to-high-end private elderly care institutions emphasize personalized demand services, but they usually charge higher fees, which most elderly

people cannot afford, resulting in a significant gap in inclusive elderly care institutions <sup>[6]</sup>. The lack of operating entities for community day care stations has led to most home-based elderly care services being provided by community staff as part-time jobs, and there is an urgent need to improve operational capacity.

### **2.3.2. Gaps in the public welfare philosophy of elderly care service institutions**

With the advent of the silver hair wave, various social capital has entered the elderly care industry, involving multiple fields such as home-based, community, and institutional care. The profit-seeking nature of social capital has led some businesses to invest blindly, pursue large projects, and take a high-end approach, aiming to pursue high returns. Some even target high-end healthy elderly individuals. Therefore, the government needs to further guide and strengthen the public welfare philosophy, actively build a diversified elderly care service market that meets the needs of multi-level elderly individuals, and increase care and attention for low-income and disadvantaged elderly groups.

### **2.3.3. The quality and capability of the elderly care service talent team need to be improved**

The management and operational levels of elderly care service institution operators vary widely, and the construction of a professional management team has not yet been formed. Due to traditional beliefs, regional economies, and other factors, practitioners generally face issues such as low overall quality, professional level, and lack of professional care knowledge. In particular, elderly care service institutions lack professional talents such as rehabilitation technicians, nutritionists, and senior nursing staff. There are also deficiencies in assessment and incentives. Many years of cultivating excellent elderly care practitioners have been lost due to the attraction of high-paying areas such as Beijing and Tianjin, further leading to a shortage of talent in elderly care service institutions.

## **3. Suggestions for the future development of the elderly care service system in Qinhuangdao City**

### **3.1. Strengthen the promotion of elderly care services and guide the updating of the traditional concept of “providing for the aged”**

Some people believe that the stereotype of sending elderly parents to elderly care institutions is a sign of children’s disrespect, and this mindset is deeply ingrained. The government needs to continuously increase the promotion of elderly care services. By inviting the elderly and their children to visit and experience elderly care institutions, people’s understanding of institutional care can be enhanced, and a correct concept of elderly care can be established. At the same time, it is necessary to deepen the reform of elderly care institutions, improve the operational efficiency of public elderly care institutions, optimize the diversified supply of elderly care services, establish positive access and negative exit mechanisms, and continuously enhance the vitality of elderly care institutions <sup>[7]</sup>. For the service needs of the elderly who are advanced in age, disabled, intellectually disabled, living alone, or empty-nesters, a dynamic management information database for special groups of elderly people should be established, the scope of aging-friendly renovations should be expanded, and professional social organizations or institutions should be entrusted to strengthen service guarantees for these special groups.

### **3.2. Strengthen institutional normalization guidance to further accelerate the development of elderly care service institutions**

The government should implement preferential policies and financial subsidies, encourage various types of social



capital to invest in the elderly care service industry, establish elderly care service institutions for different income groups, and guide more enterprises to provide affordable and inclusive elderly care services that are affordable for most elderly people. Adhere to the principles of government leadership, social participation, market operation, overall planning and development, basic security, and diverse inclusivity. Develop practical implementation details and evaluation methods, and promote the standardization and normalization of elderly care services. Improve the comprehensive supervision mechanism of elderly care service institutions and promote the construction of a social credit system in the field of elderly care services. Implement full-process, full-chain, and comprehensive supervision of elderly care service institutions, and implement disciplinary measures for elderly care service institutions and personnel who have lost trust and violated laws and regulations, creating a stable environment for elderly care <sup>[8]</sup>.

### **3.3. Strengthen the diversified construction of elderly care services and continuously optimize the supply of elderly care services**

The integrated development of medical and elderly care services should be promoted. The government should promote the transformation and upgrading of elderly care institutions, increase nursing beds and facilities, support elderly care institutions and medical and health institutions to sign cooperation agreements, and encourage medical institutions to provide “mobile” rehabilitation, nursing, medication, and other home-based services <sup>[9]</sup>. Use community health service stations to enhance the medical and nursing capabilities of community daycare centers. Enrich public cultural service products to meet the entertainment and social needs of the elderly and alleviate their spiritual loneliness. In terms of rural elderly care, actively promote services such as centralized dining assistance, mobile medical assistance, fixed-point entertainment assistance, and home-based care assistance. Guide mature elderly care institutions in urban areas to open branches in rural areas, encourage the development of chained, standardized, and large-scale elderly care service groups, cultivate elderly care service brands, combine rural revitalization with local conditions, develop mutual assistance elderly care models that are suitable for rural characteristics, and gradually continue to promote them.

### **3.4. Improve and strengthen the construction of the elderly care service talent team**

The government has taken multiple measures in terms of employment mechanisms, benefit guarantees, and vocational training to continuously improve the training mechanism for elderly care service talents. Build a three-in-one elderly care service talent training model that integrates “academic education + continuing education + practical training” to promote the professionalization and specialization of elderly care workers. Encourage vocational colleges to add majors related to elderly care services, build elderly care service training bases, strengthen pre-job and on-the-job training for elderly care practitioners, and continuously improve the quality of elderly care service practitioners <sup>[10]</sup>. Leveraging the resource advantages of medical and nursing institutions in Beijing and Tianjin, adopt methods such as entrusted training or targeted recruitment to better meet the needs of home-based elderly care services.

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# Reflections on the Phenomenon of Middle School Students' Internet Addiction from a Philosophical Perspective

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**Abstract:** With the continuous innovation of modern technology, the Internet has integrated into every corner of society. For middle school students, how to leverage the advantages of the Internet while avoiding excessive addiction to it has become a hot topic of social discussion at this stage. In the information age, people are accustomed to obtaining various information through the Internet, which is convenient to operate, fast and wide in information transmission, but it also exposes many negative issues. Especially, young students are excessively addicted to the Internet, which makes their studies neglected and seriously threatens the stable development of young people and society. This article attempts to explore the reasons and negative impacts of Internet addiction from a philosophical perspective, aiming to provide a reference for relevant people.

**Keywords:** Internet addiction; Middle school students; Philosophical perspective; Reasons

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## 1. Introduction

Middle school students are in the stage of shaping their values and behavioral habits. During this period, students' minds are active and susceptible to the influence of diverse information on the Internet, weakening their self-control. Some middle school students have a strong curiosity about the novel world on the Internet. Without proper guidance and support, they may easily become addicted to the Internet and neglect their studies, which will have a negative impact on the development of their interpersonal and emotional expression skills. To guide middle school students to view and use the Internet correctly, it is necessary to strengthen educational guidance, and gradually shift their focus from the Internet to provide a solid guarantee for students' physical and mental health.

## **2. Analysis of the current situation of middle school students' internet addiction**

In the current era, middle school students' addiction to the Internet has become a global problem that harms society, ethnic groups, and countries. Some middle school students have weak self-control and spend a lot of time on online games and social media every day, neglecting their studies and even sacrificing a lot of rest time. This not only affects students' academic performance but also threatens their physical health, inducing a series of problems such as sleep disorders, decreased vision, and anxiety. With the development of the times, the forms of middle school students' addiction to the Internet have gradually diversified, extending from the initial online games to live streaming, short videos, and social media. Due to the complex interaction, feedback, and reward mechanisms of the platforms, many adolescents with weak self-control are prone to addiction and develop an "addiction" to the Internet.

## **3. Analysis of the reasons for middle school students' internet addiction from a philosophical perspective**

The Internet has integrated into every aspect of people's daily lives, study, and work, making it very difficult for adolescents to completely isolate themselves from the network. This has led many adolescents to become excessively addicted to the Internet and unable to extricate themselves. Some adolescents steal, skip school, and run away from home just to go online, and in severe cases, there have even been suicides. In response to these phenomena, this study will attempt to analyze the specific reasons from a philosophical perspective.

From the perspective of materialist dialectics, the emergence of any phenomenon is the result of the combined effect of internal and external factors. From an internal perspective, the fundamental reason for middle school students' addiction to the Internet lies in their weak ability to distinguish right from wrong, poor self-control, and inability to reasonably arrange their online time. In fact, middle school students are in the stage of forming their values and are susceptible to external influences, requiring the guardianship and cultivation of others. Therefore, the reason for students' addiction to the Internet can be attributed to the lack of school and family education.

In the current era, most families have only one child, who has been doted on by parents and elders since childhood, and many children are even spoiled, becoming too self-centered and arrogant. After children enter middle school, some parents completely entrust the responsibility of educating their children to the school. Parents are more concerned with providing material support for their children, neglecting care and education, so they do not understand their children's behavioral habits. Under such circumstances, some middle school students become more stubborn, narrow-minded, selfish, and have weak willpower and self-control. They are excessively greedy for enjoyment, especially after exposure to the Internet. They find that in the virtual world, they can say many things that they dare not say in the real world, vent their inner emotions freely, and even break the rules, focusing only on themselves. Many things that cannot be achieved in real life can be realized in the virtual network. If not guided timely and correctly, it will inevitably lead to middle school students' addiction to the Internet.

From an external perspective, inadequate supervision of Internet cafes by relevant departments is also a major reason leading to students' addiction to the Internet. However, the approach of "completely shutting down internet cafes" advocated on the Internet in recent years is unreasonable. The Internet is not the culprit behind middle school students' addiction; instead, people should deeply reflect on whether there are problems with the current education system. Many families have excellent material conditions and also have a large number of smartphones, tablets, and desktop computers at home. Without effective parental supervision, this can also lead to middle school students becoming addicted to the Internet. In fact, most middle school students spend most of their time in school

studying hard and rote learning due to the pressure of exams. Quality education has not been truly implemented, and the emergence of the Internet provides an opportunity for students to vent their study pressure. However, if students have many other positive interests and hobbies, the possibility of middle school students becoming addicted to the Internet will be greatly reduced.

Additionally, from a Marxist perspective, correct values have a guiding effect on individual behavior habits and become a source of motivation for individual progress and improvement. Conversely, incorrect values can easily lead individuals astray. With the continuous improvement of modern material living standards, many students enjoy excellent living conditions. Both parents and children are very satisfied with their current lives, which invisibly causes students to lose their motivation to continue striving and lack lofty ideals and aspirations. If middle school students have lofty ideals and aspirations, then the Internet will be a cornerstone of their success, rather than a stumbling block, helping them achieve their life goals.

## **4. Measures to address middle school students' internet addiction from a philosophical perspective**

### **4.1. Strengthening family education and supervision**

Middle school students' addiction to the Internet is not an irreversible matter. Parents should objectively view this phenomenon and maintain a positive and optimistic attitude to face it. Materialist dialectics emphasizes that everything is constantly developing and changing, so people should view problems from a developmental perspective and do a good job in family education and supervision. The values, worldview, and outlook on life of middle school students have not yet formed, so they have strong plasticity. As parents, they should objectively view Internet addiction as just a small part of their children's growth process and seek reasonable and effective educational methods to effectively help their children get out of the Internet addiction. If parents see it as an irreparable mistake, it will cause things to develop in a worse direction. From this perspective, parents' expectations and education for their children are effective means to solve middle school students' Internet addiction.

From a philosophical perspective, cultivating a qualified successor to the socialist cause requires self-awareness and rational self-discipline. In family education, parents should strengthen educational supervision, guide their children to form ideal and self-disciplined values, and recognize that the Internet is just a part of life, not all of it. Through daily communication or the introduction of case studies, parents can help their children recognize the dangers of Internet addiction, improve their ability to distinguish right from wrong, and maintain clear judgment and control in the online world. At the same time, parents can lead their children to cooperatively set rules for Internet use, emphasizing the principle of moderation in the development of things. For example, limiting the daily use of the Internet and online time for children, and regulating their online behavior by establishing Internet rules, subconsciously cultivate their children's awareness of rules and self-management abilities. Parents should also be role models for their children, consciously regulate their own behavior, abide by these rules, and cultivate good online habits for their children under the benign guidance of their parents.

Family education and supervision emphasize empathetic thinking between parents and children, mutual empathy, and understanding. Parents should strengthen communication with their children, understand their psychological status and Internet usage, patiently listen to their thoughts and viewpoints, understand their online behavior, and provide targeted guidance and support. For children's viewpoints and opinions, they should work



together to find solutions to problems, bringing parents and children closer and establishing a relationship of mutual trust.

#### **4.2. Grasping the development patterns**

In response to the phenomenon of middle school students' addiction to the Internet, educators should recognize that everything develops according to certain patterns, and teachers and parents should follow the patterns of students' physical and mental growth to guide them. Middle school students have a strong curiosity about novel things and a high acceptance of new things, but they also have a strong rebellious psychology. These belong to the growth patterns of middle school students. Therefore, teachers and parents should combine these growth patterns to educate and guide middle school students correctly, satisfying their pursuit of novelty and fashion, and eliminating their resistance and fear. At the same time, educators should focus on guiding students to view the advantages and disadvantages of the Internet from multiple perspectives, distinguish Internet information, learn to independently control their online time, and obtain network content. Compared with the blind suppression method, this approach is more likely to be recognized and accepted by students, eliminate their rebellious psychology, and improve the effect of educational guidance.

#### **4.3. Identifying the crux of the problem**

From the perspective of materialist dialectics, different things have different contradictory characteristics, so specific problems should be analyzed specifically, rather than attributing students' Internet addiction behavior to one category. Existential philosophy advocates individuals' exploration and confirmation of themselves. Middle school students are in a critical stage of self-identity and sense of existence formation. Limited by factors such as academic pressure, social obstacles, and family relationships, some middle school students have developed feelings of helplessness and loneliness. The online world is instant and virtual, providing a safe haven for students to escape the real world. Faced with the temptation of the Internet, due to the conflict between their self-control and freedom, middle school students are more eager to enjoy the fun brought by the Internet, but they also recognize the negative impact of excessive use of the Internet. Therefore, after identifying the crux of the specific problem, targeted solutions can be found. For example, some students are addicted to online chatting, some are addicted to online games, and some are addicted to browsing unhealthy information. Teachers and parents should adhere to the principle of taking advantage of the situation and finding specific solutions to problems. For example, middle school students who like to browse unhealthy information can receive sex education at an appropriate time to reduce their exploration of gender information, form correct cognitive concepts, and avoid excessive addiction to the online world.

#### **4.4. Strengthen the education of “three views”**

The “Three Views” include values, worldview, and outlook on life. Values objectively show the criteria for students to distinguish between right and wrong. Firstly, the internet environment is flooded with violent, vulgar, and other harmful information. Middle school students are still in a critical stage of forming their values, and their information discrimination ability and self-control are inadequate, making them vulnerable to the influence of negative information on the internet. Therefore, schools and families should strengthen communication and collaboration, adopting methods such as family dialogue and classroom education to guide students to form correct values, objectively distinguish the quality of information, and resist the temptation of harmful information.

Secondly, it is necessary to broaden students' worldviews. Whether students form a correct worldview is related to their perception of the world. Strengthening worldview education can guide middle school students to objectively view the relationship between the internet and designed life, encourage students to actively participate in social practice, step out of the virtual environment, feel the beauty of nature, broaden their horizons, and cultivate humanistic care. Thirdly, establishing an outlook on life can help middle school students clarify their life goals and direction. To strengthen life outlook education, educators should guide middle school students to deeply reflect on and analyze the value of life, encourage students to set long-term goals, or draw strength from subjects such as literature and philosophy, recognize individual values and missions, enthusiastically face life, and reduce their dependence on the internet.

## 5. Conclusion

In summary, middle school students' internet addiction is an issue related to the stable development of individuals, society, and the country. People should calmly consider the causes of this problem, strengthen education and guidance, and create a benign growth environment. This can guide students to form the correct "Three Views" and break away from the online world.

## Disclosure statement

The author declares no conflict of interest

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# Research on the Promotion of Chinese Culture in the Context of Mobile Learning: A Case Study of Entertainment-Based Chinese Learning and Cultural Exchange Apps

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**Abstract:** With the popularity of mobile devices and the rapid development of the internet, mobile learning has become a new mode of learning. This paper takes entertainment-based Chinese learning and cultural exchange apps as examples to explore how digital media can promote the spread of Chinese culture in the context of mobile learning. Mobile learning has distinct characteristics so there are challenges when learning Chinese. Based on this, this paper proposes a Chinese culture digital dissemination plan that integrates design concepts and features. The paper aims to provide new ideas and methods for the inheritance, development, and global communication of Chinese culture.

**Keywords:** Mobile learning; Chinese culture dissemination; Digital media; Cultural apps

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## 1. Introduction

With the development of the internet era and the widespread use of mobile digital devices, digital media is reshaping the way people acquire knowledge and information. The wave of the information age has brought about more frequent cultural exchanges and dissemination, presenting both opportunities and challenges for Chinese culture. In recent years, China has been emphasizing “telling China’s story well, making China’s voice heard.” How to utilize digital technologies to integrate and utilize Chinese cultural resources, digitize information to allow Chinese culture to spread more widely and effectively, and let the world feel the unique charm and profound cultural heritage of Chinese culture requires in-depth study.

## **2. Mobile Learning**

### **2.1. Research Status**

Mobile learning refers to the ability to learn anytime and anywhere using any mobile device. It is a new type of learning that emerges from the integration of new media technologies and teaching activities, featuring two-way communication and interactivity. It is an innovation in distance education and non-paper-based learning <sup>[1]</sup>.

A study by Ye Chenglin discussed the definition and current status of mobile learning, pointing out five key factors influencing its development as well as current trends <sup>[2]</sup>. Shen Rui's study explored the integration approaches and methods of Chinese learning resources in the context of mobile learning by analyzing the teaching resources for teaching Chinese as a foreign language, their application situations, and the utilization problems <sup>[3]</sup>. Chen Guo discussed the concept of new media and the advantages of mobile learning, with an analysis of its application in teaching Chinese as a foreign language, to highlight the inspirations for Chinese international teachers <sup>[4]</sup>. Overall, existing research on mobile learning and digital media has mainly focused on Chinese language teaching and the exploration of teaching resources and formats. However, there are few studies on the application of mobile learning in cultural education for Chinese language learners. Therefore, it is of great value to explore how digital media in mobile learning can promote the modernization of Chinese culture transmission.

### **2.2. Characteristics of mobile learning**

#### **2.2.1. Convenience**

Mobile learning breaks the constraints of time and space, allowing learners to access abundant online resources at any time and place through mobile phones or computers. It enables flexible learning, where learners can arrange study time according to their schedules. The network resources include images, audio, video, and other modes, which can stimulate multi-sensory involvement, to deepen understanding and enhance learning effect. Mobile learning makes knowledge acquisition more convenient and efficient and enriches the learning experience.

#### **2.2.2. Personalization**

Mobile learning can better meet learners' individual learning needs, to improve their motivation and creativity. Based on learning goals and preferences, learners can freely choose the time, place, and content of study.

#### **2.2.3. Cost-effectiveness**

Mobile learning saves time and resources to reduce learning costs. Before the internet era, people used printed books and notebooks, which were not only inconvenient to carry but also took up space. Now, a mobile device can store a large amount of learning resources, helping learners take notes anytime and anywhere.

### **2.3. Issues in Chinese language mobile learning**

With the widespread of mobile devices such as smartphones and tablets, language learning apps have become an effective tool for second language learners beyond traditional classroom learning. However, these relevant apps now mainly include dictionaries, exam preparation, and skill training, with little content related to Chinese culture and social life <sup>[5]</sup>. To address this issue, more cultural elements should be incorporated into Chinese language apps or dedicated cultural sections should be developed to help international students better understand Chinese culture, reduce cultural conflicts, and showcase the real appearance of Chinese society. This will stimulate learners' interest in learning Chinese and improve their proficiency <sup>[6]</sup>.

### **3. Role of digital media in the Chinese culture dissemination**

#### **3.1. Global communication of culture**

Compared with traditional cultural transmission methods, digital media can break time and space barriers to accelerate the Chinese culture global transmission with less cost. Network digital technology enables culture to achieve all-around digitization in different stages such as creation, processing, and consumption <sup>[7]</sup>. After digitalization, different cultures can be widely shared to promote cultural exchange and information sharing between countries, nations, and peoples, thus providing more efficient ways and broader platforms for spreading outstanding Chinese culture globally.

#### **3.2. Dynamic development of culture**

The rapid development of digital media has increased the influence of different types of cultures. Chinese traditional culture and modern culture are in constant exchange, collision, and integration, forming contemporary Chinese cultural characteristics. The integration of traditional cultural elements with modern information technology allows culture to be expressed not only through images and audio but also through immersive virtual environments. Despite the challenges of cultural differences, there is room for reconciliation between native and foreign cultures. Strengthening cultural exchange and integration not only promotes the continuous development of Chinese culture but also fosters mutual understanding and respect between Eastern and Western cultures <sup>[8]</sup>.

#### **3.3. Cultural exchange and integration**

The global communication of cultural digitalization facilitates the overcoming of cultural barriers and reduces transmission loss caused by language differences. Digital media on the Internet has expanded the dissemination mode of cultural information from the original single text form to a multimodal and diversified one, providing personalized and diversified learning options for learners all over the world. It can better stimulate people's interest in different cultures and improve the authenticity and effectiveness of cultural experiences.

Therefore, educators should actively utilize the advantages of global cultural digitalization to promote a better understanding and appreciation of Chinese culture among people from different languages and cultural backgrounds. Meanwhile, educators should also adopt an attitude of equality and mutual learning towards different cultures and civilizations and jointly promote the diversified development of global culture.

#### **3.4. Interactive symbiosis of cultures**

In the internet era, mass media emphasizes enhancing communication and interaction between people through digital technologies to build social connections. Through social networks, users can discuss and share cultural content, strengthening cultural identity. On one hand, information spreads rapidly and comprehensively worldwide, accelerating the integration of world cultures. On the other hand, social networks blur the boundaries of cultural identity. Interactions between different ethnic and cultural communities allow people to better understand and appreciate various cultures, providing new ideas for cultural communication, and truly achieving global cultural interaction and symbiosis <sup>[9]</sup>.

### **4. Case study: Chinese cultural dissemination plan design for an app**

#### **4.1. Basic information about the app**

This study takes the “entertainment-based Chinese learning and cultural Exchange app” developed by the project

team as a case study. The app uses the “Chinese Island” learning mode and aims to establish an autonomous Chinese learning platform. By using digital technologies, this app focuses on the cultural characteristics and needs, proposing targeted design to enhance the global visibility and influence of Chinese culture. Its design concept is to present Chinese learning and cultural content through gamification to create an interactive, information-rich, and enjoyable learning environment. It combines traditional cultural teaching with modern entertainment elements, integrating leisure, humanities, games, quizzes, interaction, and entertainment. The goal is to offer resources and autonomy to learners so they can gain relevant knowledge through games. The gamified learning mechanism motivates learners’ creativity and enthusiasm.

## **4.2. User interface design**

The app adopts an “interactive community” design, constructing a virtual environment where each building has a unique function, endowing learners the right of independent choice. The system has “island” scenes corresponding to user levels. New islands with new tasks and challenges can be unlocked as experience points grow. The interface employs low-saturation background colors to ensure simple, fixed color schemes, which can reduce visual stimulation and enhance comfort. The design aims to create a relaxed and pleasant learning atmosphere, allowing users to concentrate on their learning tasks and improving learning. Overall, the app offers a challenging yet comfortable learning environment through well-designed interface and color schemes.

## **4.3. Intelligent social interaction design**

The success of any learning platform depends on social interaction. A good social environment allows users to cross time and space barriers and build a learning community. This app’s cultural section integrates intelligent social features, encouraging users to share learning outcomes and cultural experiences, promoting global interactions, and deepening cultural understanding and recognition.

Therefore, educators need to recognize the significant role of digital media in cultural dissemination and make full use of its advantages to promote the global spread of Chinese culture. By leveraging the strengths of domestic and international social media platforms, such as QQ, WeChat, Facebook, Twitter, TikTok, YouTube, and so on, educators can enhance cultural promotion to attract more people to engage with and experience Chinese culture, further forming a fan effect and word-of-mouth spread among Chinese language learners <sup>[10]</sup>.

## **4.4. Learning content classification**

In the digital dissemination of Chinese culture, cultural differences between China and the West may affect the impact of cultural communication, even leading to cultural conflicts. The best way to present Chinese culture’s charm to the world is by focusing on the audience’s experience. Therefore, the app’s cultural section follows a cultural stratification mechanism. Chinese culture’s global dissemination is divided into basic artifact level, intermediate institutional level, and advanced spiritual levels. Among these, the material level has higher output, better social recognition, and lower dissemination difficulty <sup>[9]</sup>. Therefore, the app optimizes the structure of Chinese cultural output and adjusts the proportions of different levels to promote the digital integration of Chinese culture.

## **4.5. Featured solution design**

One of the app’s core features is the immersive cultural experience center, which utilizes augmented reality and

virtual reality technologies to offer users a comprehensive immersive experience, bridging the gap between the real world and Chinese cultural elements<sup>[11]</sup>. Through simulating the entire cycle of cultural project experiences, such as making oil-paper umbrellas, the craftsmanship of folding fans, and the creation of ink-wash paintings, the learning journey becomes vivid and interesting. In addition, virtual market bargaining and exploring ancient temples enable learners to deeply and vividly understand the characteristics of Chinese culture. Each phase of the game revolves around a specific theme. Taking ink-wash painting as an example, players can freely conceive landscapes and pastoral scenes, match characters and scenery, and appreciate famous works to stimulate cultural enthusiasm. The project will also collect the experience feedback of learners to ensure the journey of Chinese culture with full of interest and challenge.

#### **4.6. Strategies to enhance the effectiveness of cultural dissemination**

In addition to feature projects and social interactions, it is essential to continuously enhance the attention and connection foreign learners have with Chinese culture during the app's cultural promotion. This requires not only focusing on foreign learners of Chinese but also considering the large group of overseas Chinese. The app can leverage cultural festivals or collaborate with social media platforms to expand its audience base and encourage users to learn and understand Chinese culture. By integrating features such as achievement sharing, language partner matching, and community discussions on trending topics, the app can stimulate users' desire to share. Additionally, the app will employ analytics tools to collect user data and track their usage patterns. This will help identify the most popular function and areas needing improvement, allowing for continuous adjustments to the cultural content to meet the diverse needs of learners, thus optimizing the cultural dissemination plan.

### **5. Conclusion**

In the context of mobile learning, the development of digital media has provided new opportunities for the dissemination of Chinese culture. This research takes a cultural learning app as an example to explore how to utilize digital media technology to promote the dissemination of Chinese culture. By analyzing the characteristics and advantages of digital media and combining the characteristics of Chinese culture, a relatively targeted game-based cultural dissemination program design has been proposed. In the future, with the continuous progress of digital technology and the in-depth popularization of mobile learning, the global dissemination effect of Chinese culture will be even more remarkable. It is believed that digital media can make greater contributions to the development and dissemination of Chinese culture.

#### **Disclosure statement**

The authors declare no conflict of interest.

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# An Analysis of the International Communication Path of Chengdu's City Image from the Perspective of Transcultural Communication

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**Abstract:** Chengdu's "cozy (*Ba shi*) life" has gone abroad and has become a phenomenal event in international communication in recent years. This paper, guided by transcultural communication theory, conducts a study of Chengdu's city image, exploring its international communication path from three dimensions: communicative subjects, communicative symbols, and narrative strategies. The findings of this research aim to provide new strategies for city international communication and offer insights for promoting China's image and Chinese culture globally.

**Keywords:** City image; Chengdu; Transcultural communication; International communication

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## 1. Introduction

The international communication of the city image is conducive to building a credible, appealing, and respectable image of China, and is an important part of the international communication of Chinese culture. Based on the theory of transcultural communication, this paper interprets the city image of Chengdu from the perspective of transcultural communication and analyzes its international communication path in combination with the development of international communication.

## 2. Cultural transmission

At present, international communication is moving from "cross-cultural communication" to "transcultural communication", the latter emphasizing the construction of a global communication system. It seeks to create an inclusive, harmonious, and mutually respectful environment for communication. China's international communication is built on the concept of a "community with a shared future for mankind", aiming to promote

Chinese narratives and discourse on a stable and clear foundation, through various mediums such as media, educational exchanges, and personnel communication. This goal is to help the world to understand, recognize, and identify with China, thereby shaping and maintaining a credible, appealing, and respectable image of China <sup>[1]</sup>.

### **3. Interpretation of Chengdu's image**

“City image refers to the impression formed by the public based on elements such as the geographical environment, economic level, social security, landscape architecture, public facilities, legal system, governance model, historical and cultural traditions, and citizens' values, lifestyle and behavior patterns” <sup>[2]</sup>. On a macro level, city image is the system of key characteristics recognized by the audience. On a micro level, it is the overall impression shaped by communicators through media channels and accepted by the audience. This section focuses on analyzing Chengdu's city image from a micro perspective.

#### **3.1. Symbolic imagery in city image construction**

In shaping the city image, it is very important to select symbols and interpret them. In the process of viewing, selecting, and communicating, the audience forms their understanding of the concrete symbols. In the process of input and output, decoding and encoding, they strengthen their memory and shape their imagination of the city. According to the survey of China Youth Daily, the most popular cultural elements are Sichuan Opera Face-Painting (50.9%), pandas (49.1%), the sun and immortal bird (48.0%), *Sanxingdui* (45.9%), Shu brocade and Shu embroidery (41.2%), and so on <sup>[3]</sup>. In addition, characteristic symbols such as hot pot, skewers, and Chengdu dialect can influence the foreign audiences' first impression of Chengdu, and establish a connection.

#### **3.2. Media events promote the comprehensive reproduction of city space**

Media events are functional, ritualistic, and performative. These roles make media events a crucial force in the comprehensive reproduction of city space. Chengdu has successfully hosted international events such as the United Nations World Tourism Organization conference, the Triathlon World Cup, and the 81st World Science Fiction Convention. Additionally, the city is actively preparing for international sports events such as the 2024 Thomas & Uber Cup and the 2025 World Games.

As media events, international activities can effectively utilize urban resources, combine with cultural backgrounds, and create a series of dynamic experiences to promote cultural exchange with the city. For example, the short video “Many ‘Curious Babies’ Experience the Magic of TCM in the FISU Games Village” with over 7 million views, published by Chengdu Daily, captures the charm of traditional Chinese medicine and shows that the Chengdu Universiade is not only a sports event, but also a cultural exchange between China and the West.

### **4. The development of international communication of Chengdu's city image**

As China's “national central city”, an inland economic opening-up highland, and a hub for the “Belt and Road” initiative, Chengdu's national strategic position is steadily rising, making it an important window for showcasing China's image. The international communication of Chengdu's city image has evolved along with changing times.

#### **4.1. Exploration period (from nonexistence to existence)**

As exchanges between China and foreign countries gradually deepened, the Chengdu Municipal Party Committee



Propaganda Department and Chengdu Media Group founded *HELLO Chengdu* in 2008 to provide foreign friends living in Chengdu with information about Chengdu and life in China, marking a key step in international communication. Since then, Chengdu has launched the local English website Go Chengdu in 2014, and the TV program “Looking West to Chengdu” in 2015, further enhancing Chengdu’s international image.

## **4.2. Development period (Integration of resources)**

In 2011, Chengdu took the lead in launching a 30-second tourism promotional video in Times Square, marking a milestone in the city’s international communication. In the same year, Chengdu elements were implanted in the movie *Kung Fu Panda 2*, further advancing Chengdu’s international profile. At the same time, Chengdu cooperated with international media agencies such as Reuters, Bloomberg, and the Associated Press, and various domestic websites, platforms, and streaming media to spread its message globally.

## **4.3. Growth period (Rapid development)**

In recent years, Chengdu has actively laid out the international communication of its city image, forming an international communication team and establishing the Chengdu International Communication Center to strengthen its international communication channels and capabilities. According to the 2020 “Global City Rankings” by GaWC, Chengdu rose from 71st in 2018 to 59th. In 2022, Chengdu ranked 62nd for “livability” in the “Global Cities Youth Development Potential” report, indicating that the city’s livability has been globally recognized.

# **5. Analysis of Chengdu’s international communication path**

Based on transcultural communication’s emphasis on equal interaction and mutual respect, this paper analyzes the international communication practice of Chengdu’s city image from three aspects: the subject communication subjects, the communication symbols, and the narrative strategies.

## **5.1. Communicative subjects in transcultural communication**

Under the transcultural communication model, the decentralized nature of media communication results in a more diverse range of communicative subjects. The communication of Chengdu’s city image can be analyzed from two perspectives: self-presentation and other-presentation.

### **5.1.1. Self-presentation**

Self-presentation is the leading force in the construction of a city’s image, including mainstream media, self-media, and commercial platforms. In terms of mainstream media, such as Sichuan TV, Chengdu TV, *Sichuan Daily*, and *Chengdu Daily*, reports on Chengdu’s major and minor events, providing audiences with detailed and comprehensive information. As for self-media, Chengdu’s open and inclusive attitude has attracted Internet celebrities represented by Li Ziqi to spread Chinese culture on foreign social media. And commercial platforms, such as TikTok, YouTube, and Bilibili, have played key roles in broadcasting Chengdu’s international events.

### **5.1.2. The other-presentation**

In addition to self-representation, other representation has a subtle yet significant impact on communication. The participation of diverse subjects transforms the traditional “one-way communication” method into a “multi-voice

resonance” approach, “integrating China and foreign countries” in international communication. For example, videos about Chengdu’s life have gained popularity on YouTube, with foreign influencers in China playing a key role in public communication. Their immersive content helps promote Chengdu’s image and reduce stereotypes about Chinese cities.

In the video “Our First Impression of Chengdu” released by Nico, a “foreign internet celebrity”, she shared her life in Chengdu and expressed her feelings. Netizen @Phil commented that Chengdu is a city suitable for vacation and hopes to live in Chengdu in the future. Many netizens expressed their appreciation and yearning for the image of Chengdu shown by the “foreign internet celebrity”<sup>[4]</sup>.

## **5.2. Transcultural communication symbols**

Cultural symbols, as important carriers for constructing a city’s image, play a key role in shaping the audience’s memory and imagination of the city. It directly influences the effectiveness of city image communication. Chengdu’s cultural symbols are characterized by multi-modal contextual empathy, integration of culture and civilization, and co-creation of technology and daily life.

### **5.2.1. Multimodal contextual empathy**

The transcultural communication theory advocates for equal interaction and integration between cultures. This consensus is more easily grasped from an emotional perspective. Empathy is an inherent human ability that, through emotional activation, triggers physiological responses to facilitate intrapersonal communication. Through emotional awakening, individuals develop a desire to share and drive social behaviors, which then leads to compound communication based on personal networks. These two pathways are based on the physiological drive and social construct of empathy. The key to cross-cultural empathetic communication strategies lies in bridging the gap between “you” and “me”, connecting different groups as “companions”, and overcoming differences through cultural stories that gain recognition. The construction of a multi-modal discourse system provides abundant resources for the widespread dissemination of information, which can intuitively evoke emotional resonance among international audiences.

Chengdu’s development concept showcases the rich culture of Tianfu and China to the world. With the rapid growth of digital platforms in the context of intelligent media, audiences from diverse cultural backgrounds gain a unified interpretation and emotional resonance with the city’s image, achieving the goal of empathetic communication.

### **5.2.2. Integration of culture and civilization**

Fan Yugang argues that China’s rise ultimately represents a cultural revival and the rejuvenation of Chinese civilization. In the context of transcultural communication, Chengdu’s international image should emphasize the role of cultural and civilizational integration in enhancing communication effectiveness.

With a 4,500-year civilizational history and over 2,300 years of urban development, Chengdu boasts rich cultural and historical resources, including Ancient Shu culture, Silk Road culture, and landmarks like *Sanxingdui*, Mount Qingcheng, and Wuhou Shrine. Its intangible cultural heritage—such as Shu embroidery, Sichuan opera, and Chengdu lacquerware—also attracts global attention. These unique cultural assets connect Chengdu with the world, highlighting its cultural identity in dialogue with global civilizations.

### 5.2.3. Co-creation of technology and life

The international communication of a city's image should not only focus on cultural connotations but also modern innovative development. According to the 2023 Global Innovation Index Report, Chengdu surpassed Chicago and Houston in the top 100 "technology clusters" list and ranked 24th in the world. The 2023 Chengdu World Science Fiction Convention will also accumulate more energy to promote original innovation.

Chengdu has long promoted its reputation as a "Park City". For example, the Beihu Future Park Community incorporates a variety of natural and cultural landmarks, such as Beihu Bay, Qianzhu Garden, and the Giant Panda Breeding Research Base. In terms of community governance, a digital transformation model has been adopted to enhance residents' life quality. Each park community explores, experiments, and embodies the "Park City" concept through unique approaches, collectively advancing Chengdu's park city lifestyle toward greater intelligence, efficiency, comfort, convenience, and sustainability.

## 5.3. Transcultural communication narrative strategy

Narrative is an important support for framework expression and content presentation in cultural communication. The international communication of a city's image requires macro-narrative and micro-narrative, authoritative voice, and trendy expression, which are integrated and complementary to present a comprehensive, three-dimensional, vivid, and real city image.

### 5.3.1. Macro-narrative and micro-narrative

Macro-narrative and micro-narrative complement each other and enrich the audience's impression. Macro-narrative focuses on the overall development of the city and emphasizes the shaping of general cognition. Mainstream media typically present Chengdu's science and technology, economy, policies, etc., with accurate, comprehensive, and objective information, to enhance the audience's trust and interest. While micro-narratives focus on the sights, sounds, feelings, and thoughts associated with urban life, emphasizing the shaping of unique details. Social media pays attention to the city's daily life and disseminates infectious, fresh, and personalized information, which is conducive to building a vivid image of the city.

### 5.3.2. Authoritative voice and trendy expression

The coexistence of authoritative voice and trendy expressions helps audiences better understand information about a city's image. Professional and accurate authoritative reporting provides objective and comprehensive city information, while trendy expressions in the new media era create memorable and engaging impressions. Together, these two narrative approaches enhance international audiences' understanding of the city's image. Chengdu's primary international image on platforms like Twitter highlights it as the hometown of pandas, a tourist destination, a transportation hub, a city of international sports events, a gastronomic capital, and an international convention and exhibition capital <sup>[5-7]</sup>.

## 6. Conclusion

The goal of cross-cultural communication is to build an inclusive, harmonious, and equal communication environment that promotes a community with a shared future for mankind. The international communication of Chengdu's city image, under the perspective of transcultural communication, focuses on two communication subjects: the self and the other. It shapes cultural symbols that embody multi-modal contexts, cultural and

civilizational integration, as well as technology and life co-creation. It employs two complementary narrative strategies—macro-narratives and micro-narratives, as well as the coexistence of authoritative voice and trendy expressions. Chengdu’s achievement provides valuable insights for exploring international communication paths for Chinese cities and offers meaningful explorations for promoting Chinese traditional culture globally.

## Disclosure statement

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# A Case Study based on True-false Self Theory: An Exploration and Analysis of Narcissism and Shame

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**Abstract:** Under the background of comprehensively strengthening and improving the mental health work of students in the new era, combined with the practical work of psychological counseling, using Winnicott's true and false self theory, this paper deeply analyzes the shame experience of a 24-year-old male graduate student client, discusses the trauma of his relationship with his parents in the early stage of growth, and focuses on analyzing the influence of his mother's narcissistic behavior on his false self formation. Further, this study will analyze the root of his narcissistic damage and sense of shame, explore issues such as the sense of meaninglessness, worthlessness, and the hollow state experienced by his client, and provide reference value for the complex interaction between individual psychological development and significant others.

**Keywords:** Narcissism; Sense of shame; True and false self

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## 1. Introduction

Shame, as a universal and profound emotional experience, has a profound impact on individual mental health, behavior patterns, and interpersonal relationships<sup>[1]</sup>. In clinical practice, some clients who are troubled by the family environment try to change their parents by self-learning psychological knowledge to heal themselves. In the counseling and visiting relationship, they take the initiative to seek help but find it difficult to establish trust, and there is inner shame and estrangement in the counseling and visiting relationship. The concept of "false self" put forward by psychologist Winnicott can explain this phenomenon, which believes that in the early parent-child relationship, the mother is "not good enough" to respond appropriately to the infant's spontaneous actions, but requires the infant to obey herself, which will promote the infant to form a false self<sup>[2]</sup>. Most of these mothers are narcissistic, unable to perceive the baby's omnipotent needs. To obey the needs of the mother and the external environment, the baby prematurely represses itself, isolates itself from the real self, and forms an empty shell. Gradually, when they come into contact with the real experience, they will feel strange and ashamed, which may be an important reason for the individual shame in this case<sup>[3]</sup>. Through the case of a male graduate student



counseling, this paper analyzes the formation mechanism of shame and explores healing ways to help such clients get in touch with their true feelings, so that students can redefine the meaning of life, regain their sense of self-worth, and repair the contradictory experiences in interpersonal relationships.

## **2. The theoretical background of Winnicott's true and false self**

Winnicott's concept of "True and False Self" holds that an individual gradually constructs his or her self-identity through interaction with the primary caregiver (usually the mother) in his or her early upbringing environment <sup>[4]</sup>. In this process, if the infant's needs are responded to in a timely, appropriate, and emotionally charged manner, then the infant develops a true self <sup>[5]</sup>. The true self is spontaneous, natural, and vibrant, and is based on the baby's innate potential and true sense of the world. The authentic self individual is free to express his feelings, desires, and thoughts, and these are expressed out of genuine needs within.

If the infant's needs are not adequately, appropriately, or emotionally responded to as he or she grows up, the infant may develop an adaptive strategy to survive by constructing a false self <sup>[6]</sup>. The false self is based on accommodating and adapting to external expectations. Individuals with the false self may appear submissive, accommodating, or overly concerned with the opinions of others in their behavior, not out of genuine internal needs, but to maintain relationships with others or avoid conflict. Winnicott emphasizes that the false self is not entirely negative or false, but is to some extent a survival strategy developed by the individual in response to adverse circumstances <sup>[7]</sup>. However, over-reliance on the false self can cause the individual to lose connection with his or her true self and feel empty, anxious, or lacking self-identity, so one of the goals of psychoanalytic therapy is to help the individual regain connection with his or her true self and achieve self-integration and growth.

## **3. Case reports**

### **3.1. Summary of the visitor's background**

Xiao A is a 24-year-old male graduate student with a medium build, regular features, and a gentle temperament. Xiao A was diagnosed with tic disorder in the lower grades of primary school. He underwent psychotherapy and medication and took a year off from school. During counseling sessions, he often appeared to be half-smiling, uncomfortable, or embarrassed. His expression does not match his heart when he tells a sad story, and his expression of shame sometimes appears.

### **3.2. The client's self-statement and experience**

#### **3.2.1. Family environment and early experiences are related to shame**

As an only child, Xiao A recalled sitting on his bed when he was 2–3 years old, feeling that the world was full of danger, and even feeling that his parents were also dangerous. The most notable memory was that he was holding a toy gun in the direction of the door where his parents came in and out. When he was a child, his parents were busy with work, his mother was an accountant, and his father was a porter, with unstable work. Later, his mother entered a state-owned enterprise and was well-paid. Usually, his mother likes to complain, thinking that she got rheumatoid arthritis after giving birth because she was not well taken care of, and his father is weak and has few words. When Xiao A was in his primary school year, he attended a school in the urban and rural areas, where the environment was a jungle, and when his grades declined, he needed to rely on strength to protect himself from bullies and taunts. In third grade, Xiao A was suspended from school with tic syndrome, he took medication and

saw a psychologist during the period, and later interpreted the experience as a family illness when she minor-majored in psychology.

Two years ago, his grandpa fell ill with senile dementia, and his father stayed at home full-time to take care of him. The family joked that his grandpa looked like himself when he was 2–3 years old, with a teasing tone. Xiao A felt very ashamed and thought that he abandoned himself, and Xiao A often wondered why he was born since he was so troublesome. Mother being temperamental and dogmatic, has claimed to have read a lot of parenting books. When relatives put forward that a child crying should be coaxed, the mother insisted not to care, after a while, which made small A feel very ashamed, like a person was stripped of clothes to see. Once Xiao A said he wanted to run away from home, his parents did not stop him but let him go far, he cried at the door for a long time and then went home ashamed. On another occasion, he held a whetstone to his neck and said he would kill himself if he was not treated well, but his father told him to do it. One scene that impressed him deeply was when his mother took him riding a bike. Xiao A sang nursery rhymes happily on the back seat of the bike. Suddenly, his mother lost her temper and said that she did not like it, as if the nursery rhymes offended her.

Growing up in a hostile environment and tense family relations, Xiao A can only form an alliance with his mother and play the role of a good boy to comfort his mother. He needs to fight against his father and others for this, and he often feels ashamed in the process of taking sides. When his father tries to improve his relationship with him, he often does not come home, which makes him feel that his father is about to abandon him. His mother, the eldest, was raised by his divorced grandfather and was beaten and abused constantly growing up, so Xiao A believes her mother has never been loved. His father is the second child in the family (three brothers) and gets less attention, so the parents do not know how to treat the child, thus Little A feels that he is actually a burden. There is a sense of self-guilt in Xiao A, as the mother complained about poor health after birth, blaming his father for not taking care of themselves, which also makes Xiao A feel guilty and ashamed, thinking that the mother did not give birth for his sake.

In school, Xiao A always felt rejected and laughed at. Growing up, boys think he is a “licking dog”, and girls often express their disgust. Before, Xiao A was a little fat and tended to please others in interpersonal relationships. He did not get real respect, and the sense of shame always followed him.

### **3.2.2. Major life events and their impact**

Four major events have had a profound impact on Xiao A: First, the triangular entanglement with her parents when he was young; The absence of his father and his mother’s narcissism made it difficult for Xiao A to safely reveal his true self; Second, he suffered from tic syndrome in primary school, a physical and mental symptom of frequent abdominal twitching. Third, the entanglement between college and his girlfriend, after breaking up for a long time to forget; And fourth, the relationship with the tutor (authority), he resented the tutor’s oppression and abusive behavior and was angry at the “weakness and conciliation” occasionally shown by the tutor. These experiences are closely related to the true-false self theory and shape his sense of shame.

## **4. The “shame” analysis from the perspective of true and false self theory**

### **4.1. Formation and application of false self**

According to Winnicott, the self is an innate potential that, under favorable circumstances, can develop the ability to distinguish between “me” and “non-me.” When the mother is not good enough to meet the needs of the baby in time,

the baby cannot distinguish between me and the sense of non-self, to survive, it will automatically pick up the mother's "narcissistic" needs and confuse it with its own, and its false self is formed<sup>[8]</sup>. The infant's subservience to the mother results in a state of isolation from the spontaneous, authentic self that gives central meaning to life<sup>[9]</sup>. In this case, the visiting mother is a "narcissistic" mother who can see from her experience of neglect that the "narcissistic" mother rarely feels the real needs of the child, and keeps recounting how difficult it is to keep talking about the physical decline, the lack of social interaction, the loss of quality of life due to the cost of childbirth, and the inconsiderate father of the child. The attitude toward the baby's needs is rejection, denial, and pain, the visiting experience is anxious, the mother cannot hold him well, and the mother does not let him cry, thinking that she has seen the relevant content of psychology, advocating that they can hold the baby when they do not cry, never "coax" the child, he has to suppress their submission to the environment, to act as a "container" for the mother's anxiety<sup>[10]</sup>. As Xiao grows up, he needs to take care of his mother like a "Xiao Adult", and make up for the father's position, as the father's withdrawal makes him isolated and helpless. Therefore, the client is cautious and fearful at a very young age, fearing the negative emotions of his mother. It is recalled that once when he made his mother unhappy, she immediately took away his favorite dishes on the table. He was stunned at that time and could only admit his mistake to please his mother to get food. When he was a child, his mother was good at using a variety of "moral" constraints, such as being generous, even if he did not want to give up, but also to "Kong Rong let pear". To gain his mother's approval, he should not refuse to visit and express sadness, because then he would be labeled with a lot of labels and feel ashamed. The visit gradually became a relative and outsider in front of "other people's children." His academic and interpersonal aspects were relatively smooth, until graduate school, where he seemed to be successful, but in the graduation season, the visit ushered in a huge sense of emptiness, he does not know what he really wants, instead he just wants to lie down, but he was feeling too uneasy to truly relax.

## **4.2. The function of the visit brought by false self**

In this case, Xiao A rarely feels his mother's embrace. Narcissistic mothers tend to be more focused on their own needs and feelings and have difficulty truly understanding, accepting, and responding to their children's emotional needs. For example, when Xiao A cries out to his mother about his needs, hoping for praise and hugs, the narcissistic mother may turn the conversation around to herself, emphasizing how amazing her own similar experience is and ignoring the child's feelings. This environment makes it difficult for the child's true self to fully develop, leading to the formation of a false self. But the false self also seems to bring about function.

### **4.2.1. Adaptive function**

Meet mom's expectations and maintain the harmony of family relations: To obtain mom's limited attention and approval, Xiao A will strive to create an image that conforms to his mother's expectations. For example, if his mother wants to be well-behaved, sensible, and polite in front of her relatives and friends, Xiao A will try to suppress his true emotions and thoughts and behave flawlessly on various occasions. He will try his best to maintain a false image even though he is not willing to do so. To avoid conflict with the mother or family conflict, he will adapt to the family environment by pretending to be himself. For example, when the mother loses her temper due to some trivial matters and angrily takes away the dish during the meal and does not let the family continue to eat, Xiao A will act submissive, immediately admit his mistake, and repress his emotions to maintain superficial harmony even if he feels wronged or does not understand inside.



#### **4.2.2. Protect the function**

Avoid emotional harm: Due to mom's narcissism, children may often be ignored, belittled, or ridiculed when expressing their true feelings. To protect his fragile inner self from further harm, Xiao A will develop the false self as a psychological defense mechanism. For example, when Xiao A encounters something unhappy at school, he would like to be comforted by his mother, but past experience tells him that his mother may think it is a small matter not worth mentioning, and even blame him for not being strong enough. As a result, Xiao A learns to hide his true feelings and face his mother with false strength.

Create a psychological safe space: In the absence of a mother's real holding environment, Xiao A's heart is full of insecurity. The false self can create a relatively stable psychological safe space for the child to feel accepted under this false shell <sup>[11]</sup>. For example, Xiao A builds an ideal self inside of him that is always able to cope with challenges and be liked by others. When the child is faced with difficulties in real life, he can hide in the safe space created by the false self and escape the pressure of reality for a while.

#### **4.2.3. Social function**

Gain the recognition of others and integrate into the social circle: In interacting with others, Xiao A will use his false self to show the best side of himself to gain the recognition and love of others. For example, in school, Xiao A will try to be friendly, helpful, and good at school, and become a good boy in the eyes of teachers and classmates, especially in a flattering way around girls and female teachers. In this way, the child can get more attention and praise, and make up for the lack of emotional support in the family <sup>[12]</sup>. The false self can help Xiao A better fit into the social environment and fit into the group. For example, Xiao A will share his homework or brag with the same sex, and let others copy his homework to establish an emotional connection. He has felt a little overwhelmed in social situations for a long time. But by showing his false self, the child can follow social rules and expectations, maintain good relationships with others, and avoid being isolated.

### **4.3. The problem of false self**

Although the false self is functional, it will bring A lot of psychological problems to the visitor in the long run <sup>[13]</sup>. In this case, Xiao A has the following key issues.

#### **4.3.1. Emotional isolation and loneliness**

The false self causes Xiao A to become emotionally estranged from his true self. He has difficulty expressing his true feelings and experiencing deep emotional connections. The prolonged emotional isolation has left Xiao A feeling lonely and helpless, and empty and absent inside him even in crowds. Xiao A always feels that there is a "shell" following him, and he is rarely really happy. He often feels nervous and anxious. When falling in love, quarrels, pulling and even getting out of control can make Xiao A feel strong emotional fluctuations, and Xiao A has the pleasure of "sadoomasochism." When the other party likes him, he will want to escape, as he feels that this love is not a real stimulation.

#### **4.3.2. Self-identity problem**

Since the false self is constructed based on meeting the expectations of others, Xiao A has difficulty forming a stable self-identity <sup>[14]</sup>. Constantly switching between narcissism and low self-esteem, especially appearing meditative when it comes to job hunting and internships, he will have doubts about his own worth and abilities and lack confidence and self-esteem. In the school stage, Xiao A's self-identity almost depends on the attitude of his

mentor, so he is prone to have a lot of emotional twists and turns towards his mentor.

#### **4.3.3. Social obstacles**

The false self causes Xiao A to show unreal or artificial behavior in social interaction, and it is difficult to establish sincere and in-depth interpersonal relationships. Xiao A is afraid of being rejected or abandoned by his classmates, so he tends to maintain a distant sense of boundaries and try to avoid intimacy and real emotional communication. It can be seen from some classmates who borrow things from them that, on the one hand, Xiao A is ingratiating, but when he finds that the other party does not reciprocate in the way she wants, he will get angry and upset.

#### **4.3.4. Transmission of intergenerational trauma**

The parenting style of a narcissistic mother may make the child form a catered and ingratiating behavior pattern, but at the same time, Xiao A is also narcissistic and cannot really translate into confidence, which is a transmission of intergenerational trauma<sup>[15]</sup>. In counseling, Xiao A has a lot of similar aspects to his mother's narcissism, such as only wanting the good side of things, being unable to accept the dark side, having difficulty getting rid of the shadow of the past, difficult to integrate, understand the truth but also difficult to have a good sense of experience.

In general, the inner conflict and depression brought about by the false self led to mental health problems such as anxiety and depression in the second grade of primary school. Even accompanied by somatization hypoabdominal tic syndrome, Xiao A felt isolated and helpless at that time and took a year off from school to gradually ease. As an adult, Xiao A often felt confused, lost, and powerless, not knowing how to cope with his emotions and life (as can be seen from his first visit to the counseling room because of a breakup).

### **5. The integration of true and false self**

Xiao A's mother has a profound influence on him. She is unable to provide enough care, excessively interferes with and controls Xiao A's life, expects the child to act according to her own will, deprives him of autonomy and independence, and is indifferent to Xiao A's emotional needs. There are many neglects, occasionally even making fun of the child, expressing inconsistently, and using "joking" to fob off. In such an environment, Xiao A developed a deep sense of shame and gradually drifted away from his true self. Coping and healing with shame is a long and complex process. A counselor can help a visitor develop self-awareness by recognizing that his or her feelings of shame stem from past experiences, not from any flaws or mistakes in himself or herself. By increasing their self-awareness, they can better understand and accept their emotional needs. Gradually get to know their inner world and recognize their true needs and feelings. Through the demonstration of the counselor, a more real connection with the visitor, the defense of the fake self, encourage the visit, and even in this process, the counselor may need to temporarily take over the function of the client's fake self at some time, and help the visitor re-establish various self-functions based on the real self.

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# Research on the Application of Energy-saving and Consumption-reducing Technologies in Chemical Enterprises

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**Abstract:** With the rapid development of the social economy, ecological environmental problems become increasingly prominent and attract more attention. As a higher energy-consuming industry, chemical enterprises should take corresponding social responsibilities under these circumstances. Chemical enterprises should increase the application of energy-saving and consumption-reducing technologies in daily production to promote the transformation and upgrading of the industry. Based on this, this paper will analyze the importance of energy conservation and consumption reduction in chemical enterprises, as well as elaborate on the specific role and application status of common energy-saving and consumption-reducing technologies and discuss the application optimization strategies of energy-saving and consumption-reducing technologies in chemical enterprises, to provide some references for practitioners in chemical industry.

**Keywords:** Chemical enterprises; Energy saving and consumption reduction; Application strategy

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## 1. Introduction

In the new era, the in-depth implementation of green and sustainable development has put forward higher requirements for the production of chemical enterprises. In this regard, chemical enterprises should actively explore the effective application of energy-saving and consumption-reducing technologies in production. Through the application of energy-saving and consumption-reducing technologies, the production process is optimized, and unnecessary production steps are reduced, to improve production efficiency. At the same time, reducing energy consumption and environmental pollution will also help promote the sustainable development of chemical enterprises and make them more competitive in the market.

## **2. The importance of energy conservation and consumption reduction in chemical enterprises**

### **2.1. Enhance the economic benefits of chemical enterprises**

At present, the process of economic globalization is accelerating, and the competition in the chemical product market is becoming more and more fierce. In this context, enterprises should not only continuously improve production efficiency and product quality, but also pay attention to production costs and environmental protection. Therefore, chemical enterprises should pay more attention to energy conservation and consumption reduction, actively explore ways to reduce energy consumption in production, and further reduce the production cost of enterprises. In this way, chemical enterprises can improve the market competitiveness of their products while gaining more profit margins. At the same time, the application of energy-saving and consumption-reducing technologies can also help chemical enterprises reduce pollution emissions, obtain more government-level policy preferences and market recognition, and realize the effective improvement of economic benefits of chemical enterprises.

### **2.2. Optimize resource allocation and utilization**

With the rapid development of chemical technology and techniques, how to optimize resource allocation and utilization has become a new challenge for chemical enterprises. The application of energy-saving and consumption-reducing technology is to reduce the consumption of raw materials and energy use in chemical production through technological innovation and improvement, thereby reducing production costs and environmental burdens. In chemical production, the selection and use of raw materials have a direct impact on energy consumption and environmental emissions<sup>[1]</sup>. Adopting new or more environmentally friendly materials can reduce dependence on traditional resources, energy consumption, and waste emissions in the production process. In addition, it is also important to strengthen the control of the production process and the fine management. Enterprises should strengthen real-time monitoring and data analysis and adjust production parameters accordingly to improve resource utilization.

### **2.3. Follow the appeal for green and sustainable development**

At present, green and sustainable development has become an important trend in the development of the chemical industry, and how to reduce resource consumption and environmental pollution by taking effective measures has become a key issue for social enterprises as a “big player” of energy consumption and pollutant emissions. The application of energy-saving and consumption-reducing technologies can effectively reduce the energy consumption and waste emissions of chemical enterprises. In addition, it is also an effective way for chemical enterprises to optimize the production process and improve the efficiency of raw materials and energy utilization. In short, chemical enterprises should take the initiative to assume social responsibilities, increase the application of energy-saving and consumption-reducing technologies in production, and make positive contributions to the realization of green and sustainable development.

## **3. The specific role of common energy-saving and consumption-reducing technologies in chemical enterprises**

### **3.1. Reduce energy consumption in the production process**

Whether it is raw material processing, reaction process, or chemical production links such as separation and



purification, a lot of energy or raw materials need to be consumed. Therefore, enterprises should apply energy-saving and consumption-reducing technologies in these links, which can not only reduce energy consumption and production costs in the production process but also reduce the negative impact of production on the ecological environment. In practical applications, chemical enterprises can reduce energy consumption in the processing of raw materials by introducing advanced equipment, optimizing production processes, or adopting new technologies. Then, low-temperature, low-pressure, high-catalyst, and other technologies are used to improve the reaction efficiency in the reaction process<sup>[2]</sup>. In addition, in the separation and purification process, advanced technology can also be adopted to reuse the separated waste, reduce the discharge of reactive waste, and maximize the utilization of resources.

### **3.2. Promote energy recycling**

Chemical production is inseparable from thermal energy, and with the help of energy-saving and consumption-reducing technology to reduce heat energy consumption in the production process, energy recycling can be realized. Chemical enterprises can use waste heat recovery technology to reuse the heat energy in the waste, thereby reducing the loss of heat energy and energy consumption in the production process. At the same time, the application of energy-saving technology can also reduce the waste generated in the chemical production process and make resource utilization. This can convert waste that can only be discharged into the natural environment into production energy, achieve good energy recycling, and reduce pollution in the surrounding environment. This is also an effective way for chemical enterprises to practice the concept of sustainable development, to achieve the coordinated development of enterprise economic benefits and ecological environment.

### **3.3. Reduce the kinetic energy loss in the production process**

In the chemical production process, a large number of equipment needs to run continuously and uninterrupted to ensure the smooth operation of the production process. If the kinetic energy loss is too large, it will not only increase the operating cost of the enterprise but also reduce the production efficiency and product quality. By introducing advanced reactors and continuously optimizing the conditions and environment of the reaction process, chemical enterprises can effectively improve the conversion rate of reactants, thereby improving the quality of chemical products. Enterprises can reduce kinetic energy loss in the production process by adopting high-efficiency and energy-saving equipment, implementing frequency conversion speed regulation technology, and optimizing the heating system. For example, by optimizing the heating system in production and recycling waste heat, steam consumption can be significantly reduced. This also fully proves the effectiveness and feasibility of energy-saving and consumption-reducing technology in reducing kinetic energy loss in the production of chemical enterprises.

## **4. Common energy-saving and consumption-reduction technologies in chemical enterprises**

### **4.1. Energy-saving transformation technology of equipment**

With the rapid development of high and new technology, the production equipment in chemical enterprises also needs to be updated and upgraded, the traditional high-energy-consuming equipment is transformed and upgraded, and high-efficiency and energy-saving equipment are used to carry out production. The energy efficiency ratio of the renovated equipment will be greatly improved, which not only ensures production efficiency and

production quality but also reduces energy consumption. For example, the frequency conversion energy-saving speed regulation technology is to change the power supply frequency of the motor and adjust the speed of the motor, to change the flow rate and pressure of the pump or compressor to meet the actual production demand. The application of this technology can improve the energy loss caused by adjusting the flow rate through valves or baffles in the traditional fixed-speed operation mode, thereby reducing the energy consumption of the motor traction system and improving energy efficiency. In chemical production, centrifugal pumps, compressors, and other large-scale rotating equipment apply frequency conversion energy-saving speed regulation technology, which can effectively reduce power consumption.

#### **4.2. Heat recovery technology**

The heat energy recovery system is mainly composed of heat exchangers, steam recovery devices, etc., and its main function is to efficiently collect and utilize the heat energy generated in the chemical production process, to achieve the purpose of energy saving and consumption reduction. The heat exchanger is used to transport the waste heat generated in the high-temperature production process to the low-temperature fluid, to realize the transfer and utilization of heat. The heat exchanger can convert waste heat into other energy such as steam or hot water, and then heat some raw materials and media in production. At the same time, the steam recovery device can recompress and reuse the steam generated in production, reducing the demand for new steam and achieving the purpose of energy saving and consumption reduction. The core of the heat recovery system is to rationally configure and optimize each component to ensure the effective recovery and utilization of heat energy, maximize energy utilization, and reduce energy consumption and emissions in chemical production.

#### **4.3. Water conservation technologies**

In the production of chemical enterprises, the water used in production can be optimized through the following water conservation technologies. The first is to strictly manage water resources. Chemical enterprises should strictly monitor the use of water resources in the production process, limit and regulate wasteful behavior, and ensure the rational use of water resources. The second is the use of rainwater and unconventional water resources. Chemical enterprises with large water consumption should set up rainwater collection ponds to treat the collected rainwater as supplementary water for production and improve the utilization rate of water resources. In addition, chemical companies in coastal areas can also introduce desalination water as industrial water to minimize the use of tap water. The third is smart water management. Through the establishment of a smart water management system, chemical enterprises use big data, cloud computing, and other information technologies to achieve real-time monitoring, early warning, and optimal scheduling of water use. Through the monitoring of the amount of new water, steam, and circulating water in each production line, the daily statistical analysis, monthly statistical analysis, year-on-year and month-on-month data analysis, and alarm function of the system are used to continuously improve the production water system.

#### **4.4. Resource recycling technology**

Resource recycling is an effective way to achieve energy conservation and consumption reduction in chemical enterprises. By optimizing the ratio of raw materials and improving the utilization rate and conversion rate of production, chemical enterprises can effectively reduce the material and energy consumption of chemical production. In addition, increasing the recycling of by-products and waste generated in the chemical production

process can also improve the efficiency of resource utilization. For example, in chemical production, exhaust gases can be treated by equipment such as absorption towers, condensers, and membrane separators. Wastewater should be treated according to the corresponding requirements using aeration tanks, bioreactors, and membrane separators. The recycling of waste heat requires the use of equipment such as heat exchangers, steam generators, and heat pumps for treatment and reuse. When selecting treatment and recycling equipment, it is necessary to consider the cost comprehensively and to ensure energy conversion efficiency and environmental protection factors <sup>[3]</sup>.

#### **4.5. Fine purification technology**

First, chemical companies should choose efficient purification technologies according to the nature of the materials produced. For example, for liquid mixtures with large differences in boiling points, distillation or rectification technology can be preferred in production, using the different boiling points of the components in the material to achieve efficient separation. For solid mixtures, crystallization and recrystallization techniques are used to purify them according to the principle that their solubility changes with temperature. Secondly, chemical enterprises should also introduce advanced purification technology. For example, membrane separation technologies such as reverse osmosis, ultrafiltration, and nanofiltration have the advantages of low energy consumption, easy operation, and no phase change and their application to chemical production and purification can effectively improve the purification effect. Chromatography such as liquid chromatography and gas chromatography takes advantage of the difference in the partition coefficient between the stationary and mobile phases of different substances to achieve efficient and precise separation of production materials <sup>[4]</sup>

#### **4.6. Intelligent energy-saving technology**

With the accelerated digital transformation and upgrading in the chemical industry, the application of various intelligent energy-saving technologies has led to significant energy conservation and consumption reduction in chemical production. Currently, some chemical enterprises have introduced intelligent production systems, which, through the effective utilization of high-tech such as sensors and the Internet of Things, enable real-time monitoring of the operating status of production equipment, process parameters, and product quality. At the same time, chemical enterprises can also utilize artificial intelligence and big data analysis technologies to deeply mine and analyze the collected data, thereby optimizing production plans and process parameters. This not only enables the automation, digitalization, and intelligence of the production process, reduces labor, and improves production efficiency, but also lowers energy consumption and raw material waste through the optimization of production plans and process parameters <sup>[5]</sup>

### **5. Application status of energy-saving and consumption-reducing technologies in chemical enterprises**

#### **5.1. Chemical process updates are relatively slow**

At present, the chemical industry is facing dual pressures of energy and environment, but there are still some chemical enterprises that use traditional production processes and have not kept pace with technological innovation and upgrading. On the one hand, traditional chemical production processes often have low conversion efficiency of raw materials due to their simple technology, resulting in a significant waste of resources. In addition, traditional chemical production processes rely heavily on traditional energy sources such as coal and natural gas.

These energy sources also suffer significant conversion losses during the production process, exacerbating energy consumption <sup>[6]</sup>. On the other hand, due to slow process updates, many waste gases, wastewater, and solid waste generated during chemical production can only be directly discharged, resulting in low recycling efficiency. This not only increases the production costs of chemical enterprises but also has a certain impact on their social image and sustainable development capabilities.

## **5.2. High energy consumption of chemical production equipment**

Chemical production relies on the operation of various production equipment to achieve chemical conversion and material processing. However, these devices often require a large amount of energy consumption, leading to high overall energy consumption in chemical enterprises. On the one hand, some chemical production equipment was designed to focus on cost and production capacity rather than energy conservation and consumption reduction. Over time, this has significantly increased the energy consumption of chemical enterprises. On the other hand, chemical enterprises have a relatively long cycle for equipment inspection and maintenance, especially for systems involving high-power equipment and key operating links, such as compressors, distillation towers, etc. To ensure daily production, the maintenance frequency is relatively small. Long-term inadequate maintenance of equipment not only increases energy consumption but also accelerates wear and tear and shortens its lifespan <sup>[7]</sup>.

## **5.3. The quality of chemical production management is not high**

The relatively low quality of production management in chemical enterprises may be caused by many factors. For example, some chemical enterprises may still adopt the traditional production and operation management mode, which may have an adverse impact on the production quality and production efficiency of the enterprise. In addition, the imperfect management system is also an important reason, which may lead to the non-standard phenomenon of the production process of chemical products, and managers find it difficult to fulfill their duties. Some chemical enterprises also rely on manual inspection to inspect some chemical products, which may ignore the minor differences in the products and lead to quality problems. Chemical enterprises should increase their investment in chemical production quality management, and introduce advanced quality testing equipment and technology, to improve the accuracy and efficiency of quality testing.

## **5.4. Waste treatment needs to be improved**

The waste generated in the chemical production process is diverse and large and contains high levels of harmful components, so effective treatment and disposal technologies are essential to protect the environment and achieve sustainable development. At present, some chemical enterprises still use the traditional classification method, which is inefficient and has a large human error. At the same time, due to the lack of effective technical means, many wastes are simply stacked or dumped at will, resulting in a large amount of resource waste. In addition, although the relevant environmental protection technology has been rapidly developed in recent years, its application in waste treatment is not widespread enough compared with the scale of chemical production <sup>[8]</sup>. For example, for the treatment of some special wastes such as heavy metal pollutants and organic pollutants, more efficient and environmentally friendly technical support is still needed. In particular, some wastes in chemical production have potential economic value, such as being recycled as renewable energy.



## **6. Optimization strategy of energy saving and consumption reduction technology application in chemical enterprises**

### **6.1. Optimizing chemical production technology**

In the new era, chemical enterprises are faced with severe resource constraints and environmental pressure. To achieve sustainable development and improve economic benefits and competitiveness, how to optimize chemical production technology has become the focus of the chemical industry. In the utilization of raw materials, chemical enterprises should actively adopt efficient catalysts to improve the conversion rate of raw materials, reduce the accumulation of unreacted raw materials, reduce production costs, and improve product quality. For example, in the production process of synthetic ammonia, ethylene, and other basic chemical products, by using more efficient catalysts, the reaction can be completed under lower temperature and pressure conditions, which can not only save energy but also reduce the generation of reaction by-products, to achieve a more environmentally friendly and more economical production process. In terms of energy conservation, enterprises should continue to improve and optimize the chemical production process, through fine management, and fine-tuning of production parameters, which can effectively reduce the energy consumption in the production process<sup>[9]</sup>. For example, the use of heat pump technology to recover waste heat in the production process for heating or power generation can significantly reduce energy consumption. In addition, from the perspective of technological innovation, the integration and application of interdisciplinary technology is also an important direction to optimize chemical production process technology. For example, by combining modern information technology such as information technology and big data analysis, intelligent management of the production process can effectively improve the production efficiency and resource utilization of chemical enterprises. Through the analysis and optimization of a large number of production data, enterprises can control the production process more precisely and achieve the purpose of energy saving and consumption reduction.

### **6.2. Upgrading energy-saving production equipment**

In the chemical industry, the design of many traditional production equipment is backward, the energy conversion efficiency is low, and there is also a large amount of energy waste. Therefore, the introduction and renewal of efficient and energy-saving production equipment has become an important way to achieve the goal of energy-saving and consumption reduction.

First of all, chemical enterprises can introduce automation control technology to reduce energy consumption by optimizing production processes. For example, the real-time monitoring system can monitor various parameters in the production process in real time to ensure that the equipment is operating in the best working condition, thus reducing energy consumption. At the same time, the intelligent production scheduling system can automatically adjust the production plan according to the market demand and the supply of raw materials to avoid ineffective or excessive energy consumption<sup>[10]</sup>.

Secondly, the use of energy-efficient motors and drive systems is also an important direction to update production equipment. For example, frequency conversion speed regulation technology can adjust the running speed of the motor according to actual needs to avoid unnecessary energy consumption. High-efficiency motors, on the other hand, reduce energy consumption and emissions while providing the same power. In addition, it is important to strengthen the management of thermal energy in the chemical production process. Through heat recovery and utilization technology, waste heat generated in the production process can be effectively recovered and converted into useful energy, which can not only reduce energy consumption but also improve overall



efficiency. In addition, in the choice of equipment materials, chemical enterprises should choose to use more durable, easier-to-maintain materials, which can not only extend the service life of the equipment but also reduce the indirect energy consumption caused by maintenance and replacement.

### **6.3. Improve the management mechanism of energy conservation and consumption reduction**

It is a systematic project to improve the management mechanism of energy conservation and consumption reduction in chemical enterprises.

Firstly, chemical enterprises should clarify their energy-saving and consumption-reducing management systems. The leadership of enterprises should have a deep understanding of the actual energy consumption situation in chemical production, and then improve the management system at all levels, establish a scientific energy-saving system, and promote the sustainable development of chemical enterprises. In specific implementation, the leadership of enterprises should attach great importance to energy conservation and emission reduction work, and formulate overall plans and specific goals. Organize employees to study chemical-related regulations and standards, as well as the regulations and management systems of the company, to create a working atmosphere of energy conservation and consumption reduction for all employees <sup>[11]</sup>. At the same time, it is necessary to arrange for relevant management personnel to supervise and inspect the actual implementation situation, data accuracy, etc., and promptly rectify problems.

Secondly, in terms of energy conservation and consumption reduction management, chemical enterprises need to achieve the following points: They need to carry out energy conservation monitoring on an annual and monthly basis and formulate reasonable energy conservation and emission reduction plans, targets, and economic indicators. To establish a data collection and measurement system to track and manage various energy consumption, power generation efficiency, and other data. To apply efficient and energy-saving technologies and equipment in production to improve energy efficiency. Chemical companies should also adjust and optimize their current management mechanisms. Chemical enterprises should combine their own production process characteristics to enhance the pertinence and effectiveness of energy conservation and consumption reduction management mechanisms, to truly implement energy conservation and consumption reduction into production work.

### **6.4. Strengthen energy recycling technology**

Energy recycling technology is of great significance for promoting the sustainable development of chemical enterprises by improving energy efficiency, reducing energy consumption, and reducing waste discharge. First of all, enterprises should increase the development and application of thermal energy recovery systems. By recovering and reusing the waste heat generated in the chemical production process, energy efficiency can be significantly improved. For example, the application of waste heat boilers can convert waste heat into useful steam for use in production processes or other facilities. Secondly, chemical enterprises should increase the use of renewable energy technologies such as solar energy and wind energy in the production process, which can not only reduce the dependence of chemical enterprises on traditional fossil energy but also reduce environmental pollution. For example, the installation of solar photovoltaic panels and wind turbines has enabled some chemical enterprises to achieve energy self-sufficiency and restore excess renewable energy to the power grid. At the same time, chemical companies should also recycle the waste generated in the chemical production process as energy,

which is an innovative and effective way to save energy. Biotechnologies such as fermentation and anaerobic digestion are used to turn organic waste into biofuel; Or through pyrolysis, gasification, and other technologies to convert difficult-to-treat waste into renewable energy. Refrigeration systems account for a large proportion of energy consumption in chemical enterprises <sup>[12]</sup>. Therefore, chemical enterprises can adopt frequency conversion technology, heat pump technology, two-phase flow refrigeration, and other new refrigeration technologies to optimize the refrigeration cycle, improve the energy efficiency ratio of the system, and reduce energy consumption.

## **6.5. Use green energy to carry out production**

In daily production, chemical enterprises should increase the use of renewable energy. Chemical enterprises can install solar photovoltaic panels in the factory area to convert solar energy into electricity for lighting, power, and other needs in the production process. In areas rich in wind energy resources, chemical companies can invest in the construction of wind power facilities to convert wind energy into electricity for energy needs in the production process. Chemical companies can also consider using other renewable energy sources such as geothermal energy and biomass energy to meet the energy demand in the production process <sup>[13]</sup>. Using the above green energy to carry out production can not only reduce the energy consumption of chemical enterprises but also reduce the pollution of the environment. In addition, with the rapid development of high and new technology, chemical enterprises should also increase the application of intelligent and automated production equipment and technology in the production process, to achieve the minimum energy consumption and obtain the maximum production efficiency.

## **6.6. Increase the promotion and use of scale inhibitors**

First of all, the use of scale inhibitors can improve the heat transfer efficiency of production equipment. In the chemical production process, heat exchangers, boilers, and other equipment need to carry out heat exchanges. With the increase of the use time of the equipment, a scale layer will be formed inside the equipment, thereby reducing the heat transfer efficiency. The use of scale inhibitors can effectively prevent or reduce the occurrence of this situation, and maintain the efficient heat transfer performance of the equipment, thus reducing energy consumption. Secondly, scale inhibitors can also reduce the maintenance and replacement costs of equipment. Scaling of chemical equipment not only affects heat transfer efficiency but also may lead to equipment damage or performance degradation. In this regard, chemical enterprises should regularly let relevant staff use scale inhibitors for cleaning and maintenance, to extend the service life of equipment and reduce production disruption and maintenance costs caused by equipment damage or performance degradation <sup>[14]</sup>. In addition, the use of scale inhibitors also helps to improve the safety and stability of chemical production. Equipment scaling may lead to safety hazards such as pipe blockage and equipment overheating. By using scale inhibitors, these risks can be reduced to ensure the safe and stable operation of chemical production.

# **7. Challenges and prospects for the application of energy-saving and consumption-reduction technology in chemical enterprises**

## **7.1. Challenges in the application of energy saving and consumption reduction technology in chemical enterprises**

Although energy saving and consumption reduction have become an important reform trend in the transformation and upgrading of chemical enterprises, their application in actual production still faces some challenges. On the

one hand, energy-saving and consumption-reduction technologies are often accompanied by high research and development and introduction costs. For chemical companies, this means a lot of money needs to be invested in upgrading production technology, which may put pressure on the finances of some companies. On the other hand, some chemical enterprises have problems such as failure to implement the management responsibility for energy conservation and consumption reduction, imperfect quota index system for product energy conservation and consumption reduction, and insufficient supervision, inspection, and assessment. If chemical enterprises do not pay enough attention to energy conservation and consumption reduction, it will easily lead to the internal management organization is not perfect, and the staff is not strong awareness of energy conservation and consumption reduction<sup>[15]</sup>. In addition, in the fierce market competition environment, some chemical enterprises may pay more attention to the actual economic benefits but ignore the long-term value of energy saving and consumption reduction technology.

## **7.2. Prospects for the application of energy saving and consumption reduction technology in chemical enterprises**

With the continuous progress of science and technology, the actual use cost of energy saving and consumption reduction in chemical enterprises will be gradually reduced, and its application effect will also be significantly improved. In the future, chemical enterprises will have more opportunities to obtain advanced energy-saving and consumption-reduction technologies at a lower cost, thus reducing energy consumption and emissions in the production process. At the same time, the relevant government departments will further improve the policies and standard systems of energy conservation and consumption reduction, and provide more clear guidance and support for chemical enterprises. Through policy guidance and standards, chemical enterprises will be encouraged to strengthen the management of energy conservation and consumption reduction and improve energy efficiency. Chemical enterprises will also accelerate the pace of intelligent and digital transformation, and use modern information technology to improve the automation and intelligent level of production processes, to reduce energy consumption and emissions through precise control and optimized scheduling and other means to achieve green production and sustainable development.

## **Disclosure statement**

The author declares no conflict of interest.

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# Supply-demand Relationship of Thermal Environment Regulating Service in Xi'an from the Perspective of Functional Zones

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**Abstract:** In this paper, the supply of thermal environment regulation service is depicted by the InVEST urban cooling model, the demand for thermal environment regulation service is depicted by the risk assessment framework, and the relationship between supply and demand and quantity is depicted by supply-demand difference model, to explore the difference between supply and demand of thermal environment regulation service in Xi'an city from the perspective of functional areas. The main conclusions are as follows. The overall supply of thermal environment regulation services in Xi'an City is poor, showing a spatial pattern of high external and low internal, and the problem of unbalanced distribution is more prominent. The supply of water areas, agricultural areas, and park green space is strong, while the supply of commercial areas, residential areas, and industrial areas is weak. The demand for thermal environment regulation services in Xi'an is low on the whole, showing a spatial pattern of low outside and high inside, and the problem of unbalanced distribution is also prominent. The demand for commercial areas, public service areas, and urban villages is strong, while the demand for water areas, agricultural areas, and park green space is weak. Nearly half of the areas in Xi'an are in a state of oversupply or supply deficit, and the problem of quantity imbalance is quite serious, showing the pattern of external surplus and internal deficit in space. Residential areas, commercial areas, industrial areas, urban villages, and traffic stations are mainly in negative equilibrium, public service areas are mainly in positive and negative equilibrium, and parks, green areas, agricultural areas, water areas, and open spaces are mainly in positive surplus.

**Keywords:** Functional zoning; Green space; Cooling effect; Supply and demand matching; Xi'an City

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## 1. Introduction

Green space is an important material space carrier for regulating the urban thermal environment. Studies have confirmed that green space can form an "urban cold island" through transpiration, shading, and cold air advection,



which can effectively reduce the ambient temperature in a certain range <sup>[1]</sup>. Furthermore, the thermal environment regulating service (TERS) of the green space belongs to the ecological function which does not require water and electricity consumption. Once completed, they can play a stable and continuous cooling effect <sup>[2]</sup>. With the increasing severity of the heat island problem and the increasing attention paid to the quality of the human settlement environment, the thermal environment regulation service of urban green space has received increasing attention. The cooling effect of green space belongs to the type of climate regulation service in the ecosystem service function, and its effective play is not only affected by its biophysical properties but also closely related to the needs of residents. Hence, identifying the supply-demand relationship of green space thermal environment regulation services has become a key breakthrough direction in urban cooling research.

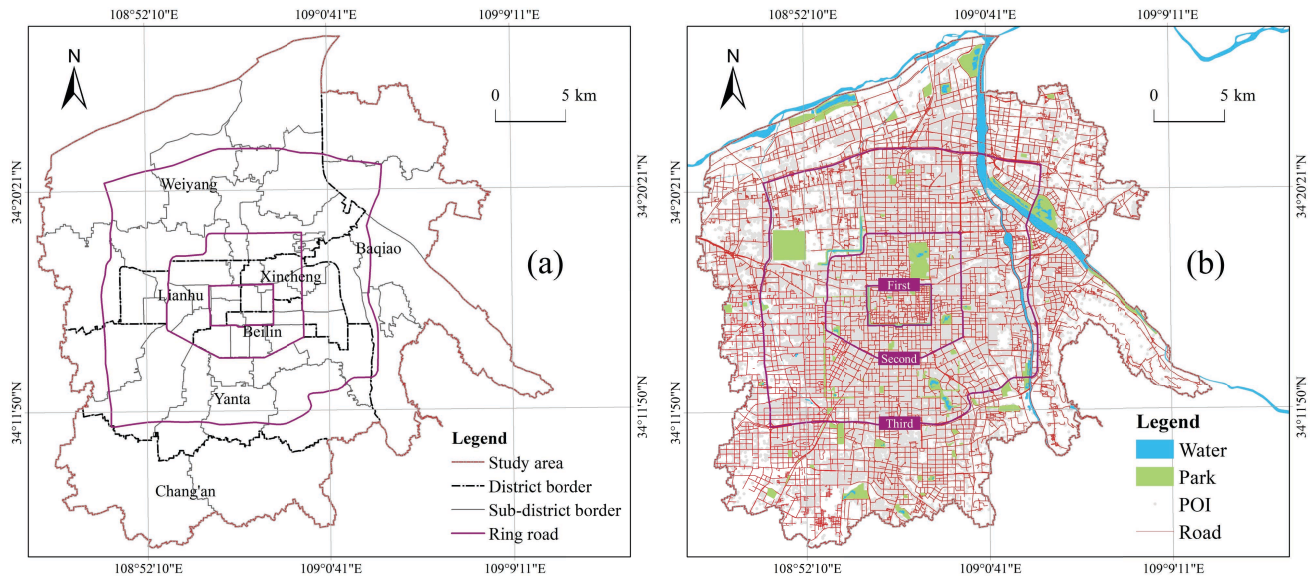
At present, the supply and demand of urban thermal environment regulation services have developed in the academic field. The supply of thermal environment regulation services can be understood as the cooling effect provided by urban green space, which is mainly evaluated by calculating the temperature difference between green space and surrounding area or cooling distance by buffer zone method <sup>[3-6]</sup>. The demand for thermal environment regulation services can be understood as the expectation or preference of urban residents for the cooling effect of green space. Considering that the residents are very diverse, and the preferences or expectations of different subjects are very different, it is difficult to quantify the demand for thermal environment regulation services, and direct research results are also very few. In recent years, some scholars have discussed the impact of the thermal environment on human society from the perspective of risk or vulnerability based on the frameworks of “risk — exposure — vulnerability” and “exposure — sensitivity — adaptability”, etc., which can reflect residents’ demand for urban thermal environment regulation services from one side <sup>[7-10]</sup>. Despite this, few studies link the supply and demand of urban thermal environment regulation services to explore the matching relationship between the two.

Based on the above research, this paper describes the supply of thermal environment regulation services through the InVEST urban cooling model, describes the demand for thermal environment regulation services through the thermal environment risk assessment framework, and describes the relationship between supply and demand and quantity through the supply-demand difference model. This study explores the difference between the supply and demand of thermal environment regulation services in Xi’an from the perspective of the urban functional zone (UFZ).

## **2. Study design**

### **2.1. Study area and data**

Xi’an, located in northwest China, is the capital of Shaanxi Province, the core city of the Guanzhong City cluster, and a national-level central city. It is also an important scientific research, education, and industrial base in China. As a typical northern megacity and hot city in summer, Xi’an has multiple urban functions. In recent years, the urban thermal environment has become increasingly harsh, and a large number of residents are exposed to high-temperature environments. Xi’an is a typical case for discussing the differences between the supply and demand of thermal environment regulation services in different functional areas. In this paper, the research scope is limited to the main urban area of Xi’an, involving 52 street offices in 7 municipal districts with a total area of 791.82 km<sup>2</sup> (**Figure 1**).



**Figure 1.** Study area. (a) main urban area; (b) built elements

In this paper, remote sensing images, built environments, and socio-economic data are used. The remote sensing image data are mainly Landsat-8 image and potential evapotranspiration data, the built environment data are mainly POI, AOI, park green space boundary, subway station, and road network, and the socio-economic data are mainly mobile phone signaling and housing price. These data sources are from the United States Geological Survey (USGS), Amap, Unicom Smart Footprint Company, and Fangtian.com. The study period was limited to 2020, with the current year's data given priority, and in the absence of data, data from adjacent years were used as substitutes.

## 2.2. Study methods

### 2.2.1. Supply model

This paper uses the urban cooling model built in InVEST 3.13.0 to evaluate the supply of urban thermal environment regulation services. The basic principle of the InVEST urban cooling model is that vegetation can increase cooling by providing shade, evapotranspiration, and changing thermal characteristics, thereby reducing urban heat islands. The working mode is to use land use, evapotranspiration, and other data, and combine the biophysical parameters of vegetation shade, surface evapotranspiration, and surface albedo of different land use types. The raster scale heat mitigation index (HMI) is calculated from the distance between different grids and cold islands (such as parks or large green Spaces) <sup>[11]</sup>.

### 2.2.2. Demand model

This paper evaluates the demand for thermal environment adjustment services from hazard, exposure, and vulnerability dimensions (**Table 1**). Hazard refers to the high-temperature disaster faced by urban residents, which is reflected by the urban thermal environment. Exposure refers to the size of the population exposed to high temperatures in the city, reflected by the number of population. Vulnerability refers to the degree of vulnerability of urban residents in the face of high temperatures, which is further subdivided into sensitivity and adaptability. Sensitivity is reflected by residents' individual attributes, and adaptability is reflected by residents' ability to access resources. Among them, risk, exposure, and sensitivity have a positive promoting effect on demand, while

adaptability has a negative counteracting effect <sup>[10]</sup>.

**Table 1.** Demand indicators of urban thermal environment regulating service

Types	Indicators	Uses	Directions
Hazard	Surface temperature (C)	Used to reflect the intensity of thermal environmental stress	+
Exposure	Population density (people/km <sup>2</sup> )	Used to reflect total population size	+
	Teen population density (people/km <sup>2</sup> )	Used to reflect the size of the population aged 14 years and under	+
	Elderly population density (people/km <sup>2</sup> )	Used to reflect the size of the population aged 65 years and older	+
Vulnerability	Housing price (yuan/m <sup>2</sup> )	Used to reflect income differences among residents	-
	Number of medical facilities (per unit)	Indicates the availability of medical resources	-
	Number of cooling facilities (units)	Used to reflect the ability to obtain cooling resources	-

Note: “+” means the higher the value, the higher the demand, and “-” means the higher the value, the lower the demand.

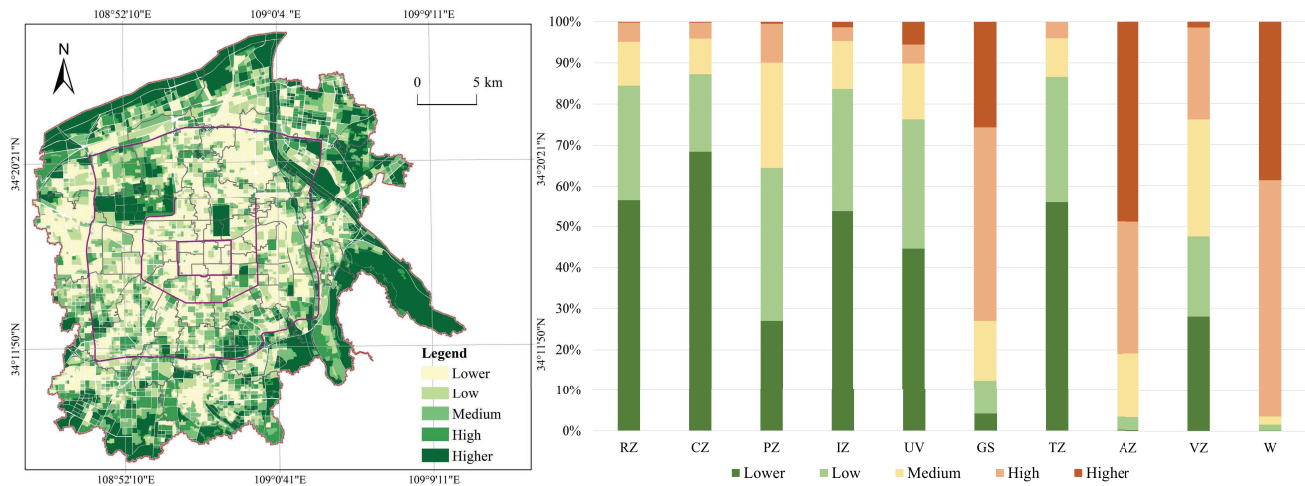
### 2.2.3. Supply-demand model

This paper uses the range normalization method to normalize the supply index and demand index calculated above and then introduces the supply-demand difference of ecosystem services to calculate the quantity difference, to reflect the supply-demand quantity relationship of urban thermal environment regulation services <sup>[12–13]</sup>. The value of the difference between supply and demand is  $-1-1$ , and a value greater than 0 indicates that supply is greater than demand and is in a surplus state; Less than 0 means supply is less than demand and is in deficit. A value of zero means supply equals demand and is in balance. Based on obtaining the difference between supply and demand, taking the mean value of the positive and negative difference between supply and demand and 0 as the threshold value, the quantity relationship between supply and demand is further divided into four types: positive surplus, positive equilibrium, negative equilibrium, and negative deficit.

## 3. Results

### 3.1. Supply assessment result of TERS

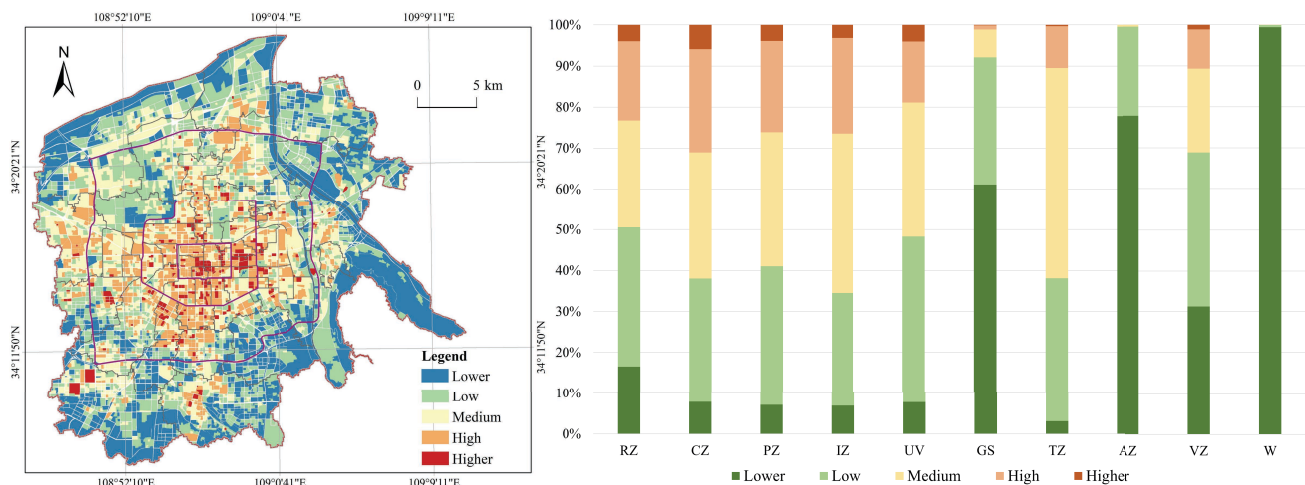
The supply index of the block-scale thermal environment regulation service was obtained by the InVEST model. The natural breakpoint method was divided into five levels, and the area proportion of the supply index in different functional zones was calculated (**Figure 2**). In Xi'an, the higher-grade (high and second-high) supply areas accounted for less, and the lower-grade (low and second-low) supply areas accounted for more, and the overall supply of thermal environment regulation services was poor. In terms of space, it shows the pattern of high outside and low inside, and the problem of unbalanced supply distribution is more prominent. In the water area, agricultural area, and park green space of Xi'an city, the supply of thermal environment regulation service is strong, and the proportion of high and low high supply areas is the largest. In the commercial area, residential area, and industrial area, the supply of thermal environment regulation service is weak, and the low supply area accounts for the largest proportion.



**Figure 2.** Spatial variation and area proportion across UFZs of supply for TERS in Xi'an. RZ: residential zone, CZ: commercial zone, PZ: public service zone, IZ: industrial zone, UV: urban village, GS: green space, TZ: traffic service zone, AZ: agricultural zone, VZ: vacant zone, W: water

### 3.2. Demand assessment result of TERS

The demand index of block-scale thermal environment regulation services was obtained through the risk assessment framework. The natural breakpoint method was divided into five levels, and the area proportion of the demand index in different functional areas was calculated (**Figure 3**). In Xi'an, high-grade (high and second-high) demand areas accounted for less, and lower-grade (low and second-low) demand areas accounted for more, and the overall demand for thermal environment regulation services was low. In terms of space, it shows the pattern of low outside and high inside, and the problem of unbalanced demand distribution is more prominent. In the commercial area, public service area, and urban village of Xi'an, the demand for thermal environment regulation services is strong, and the medium and low demand areas account for the largest proportion. In water area, agricultural area and park green space, the demand of thermal environment regulation service is weak, and the low demand area accounts for the largest proportion.

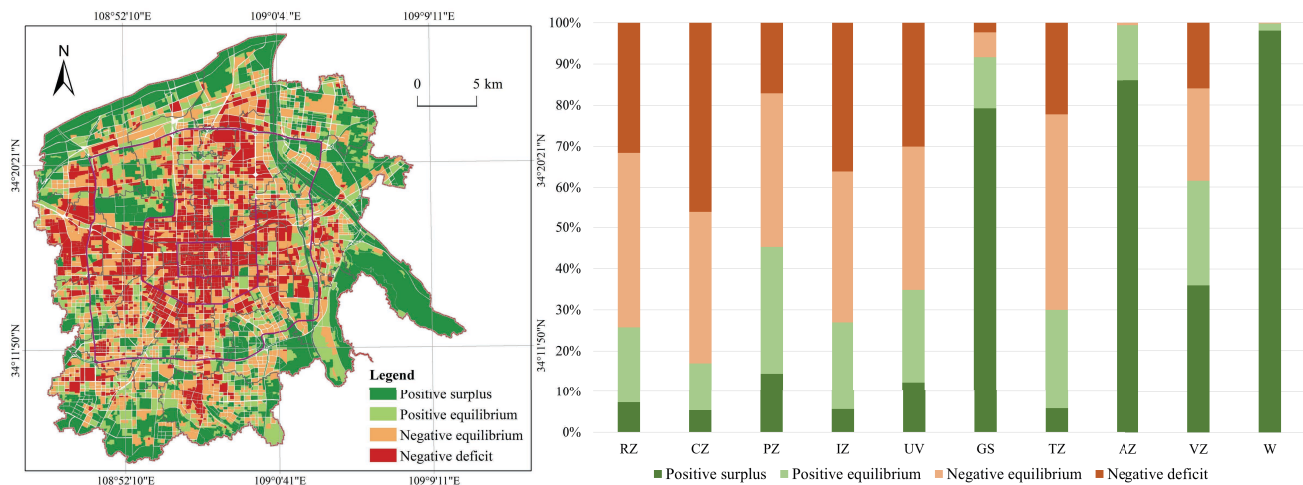


**Figure 3.** Spatial variation and area proportion across UFZs of demand for TERS in Xi'an



### 3.3. S-D relationship of TERS

The supply-demand and quantity relationship of the block-scale thermal environment regulation service was obtained through the supply-demand difference model, and the area proportion of the supply-demand and quantity relationship in different functional zones was calculated (**Figure 4**). Nearly half of the regions in the quantity relationship of thermal environment regulation services in Xi'an are in a state of oversupply or supply deficit, and the problem of quantity imbalance is quite serious. In terms of space, affected by the unbalanced distribution of supply and demand, it shows the pattern of external surplus and internal deficit, and the problem of spatial imbalance of the supply and demand relationship is also relatively serious. In residential areas, commercial areas, industrial areas, urban villages, and traffic stations of Xi'an City, the supply of thermal environment regulation services is generally less than the demand, which is dominated by negative equilibrium. In parks, green areas, agricultural areas, water areas, and open spaces, the supply of thermal environment regulation services is generally greater than the demand, and the positive surplus is mainly. In public service areas, the supply and demand of thermal environment regulation services are relatively flat, mainly in positive and negative balance.



**Figure 4.** Spatial variation and area proportion across UFZs of supply-demand relationship for TERS in Xi'an

## 4. Conclusions

This paper discusses the difference between the supply and demand of thermal environment regulation services in Xi'an from the perspective of functional areas. The conclusions are as follows. The overall supply of thermal environment regulation services in Xi'an is poor, showing a spatial pattern of high external and low internal, and the problem of unbalanced supply distribution is prominent. In the water area, agricultural area, and park green space, the supply of thermal environment regulation service is strong, and the proportion of high and low supply areas is the largest. In commercial, residential, and industrial areas, the supply of thermal environment regulation services is weak, and the low supply area accounts for the largest proportion. The overall demand for thermal environment regulation services in Xi'an is low, showing a spatial pattern of low outside and high inside, and the problem of unbalanced demand distribution is prominent. In commercial areas, public service areas, and urban villages, the demand for thermal environment regulation services is strong, and the medium and sub-low-demand areas account for the largest proportion. In water areas, agricultural areas, and park green space, the demand for thermal environment regulation services is weak, and the low-demand area accounts for the largest proportion. Nearly half of the thermal environment regulation services in Xi'an are in a state of oversupply or supply deficit, which is a serious



problem of quantity imbalance and space imbalance between supply and demand. Residential areas, commercial areas, industrial areas, urban villages, and traffic stations are mainly in negative equilibrium, public service areas are mainly in positive and negative equilibrium, and parks and green spaces, agricultural areas, water areas, and open spaces are mainly in positive surplus.

## Disclosure statement

The author declares no conflict of interest.

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# Impact of Ship Technology and Environmental Legislation on ISM Code

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**Abstract:** This paper contains a detailed analysis of the International Safety Management Code (ISM), a fundamental sea-based standard whose priority is safety through incorporating safety management systems (SMSs) that meet the requirements of shipping companies. Established by the International Maritime Organization (IMO) in 1993, the ISM Code's primary goal is to reduce maritime accidents by enforcing safety on board. This study includes the historical part of the ISM Code, the evaluation of its efficiency as well as the identification of the obstacles that stand in the way of its actual implementation. In addition to providing this information, this section also explains the rise of the ISM Code through considerations such as the effects of technology and the implementation of strict environmental legislation.

**Keywords:** ISM code; Ship technology; Environmental legislation

**Online publication:** January 23, 2025

## 1. Introduction

The International Safety Management (ISM) Code was originally developed by the International Maritime Organization (IMO) in 1993 as the very first big step forward in the cause of maritime safety and environmental protection. The ISM Code is a designed method of ensuring that shipping operators can come up with safety management systems that bring vessel operations to safety, lower the number of incidents, and minimize environmental risks. Because maritime safety is a very important part of world trade, the ISM Code is the concept of operational security; doing away with the situation of risk; and, in fact, the safe operation of ships and shipping companies is the content of the ISM Code. The study will be confined to the ISM Code from the time it was launched to the present, will deal with the question of whether it has been effective or not, and in the end, will suggest some tactics to make it sustainable in the future.

## **2. Background of the ISM code**

The International Safety Management Code (ISM Code) was the result of several shipping accidents, e.g., the capsizing of the Herald of Free Enterprise in 1987, which resulted in the need for standardized safety management systems in the maritime sector <sup>[1]</sup>. Before the introduction of the ISM code, there was no international standard that actually focused on the safety management of ships and shipping companies. The lack of formalized regulations caused differences among these safety practices, consequently leading to incidents that could have been avoided.

During the IMO Assembly in 1993, Resolution A.741 (18) was adopted, thereby the ISM code was made a requirement for ships that have passenger and cargo respectively over 500 gross tons. As time passed, the code was regularly edited and amended. the code was insisted for all ships including oil tankers and chemical carriers through the SOLAS (Safety of Life at Sea) amendment in 1998, and the coverage was improved to implement other safety aspects such as the environment and human factor.

## **3. To discuss the required policies/laws in the ISM code**

The ISM Code has two main parts: Part A and Part B. Part A contains the obligatory requirements, while Part B gives instructions for compliance. The core of the code is present in the following areas:

**Safety Management System (SMS):** Maritime transporters need to have a safety management system including plans that guarantee the proper utilization of vessels and avoidance of accidents.

**Responsibilities and Authority:** The firm should articulate the roles and responsibilities of critical personnel such as senior management, and ensure that the command structure for the safety and operation is crystal clear.

**Risk Management:** The ISM code underscores the significance of identifying hazards and adopting control strategies to keep maritime operations safe from accidents. This should be the operational hazards, namely the ones connected to the traffic in the sea, loading and unloading the ship, and environmental threats.

**Training and Certification:** Companies should make sure the crews are trained and certified as per the safety obligations to them. The process includes regular training and drills.

**Internal Audits and Continuous Improvement:** The code requires the company to (among other things) undertake internal audits to be able to monitor the SMS's performance and to this end ensure continuous improvement in safety practices <sup>[2]</sup>.

**Documentation:** The ISM Code regards documents as an important and vital factor. All security policies, procedures, and practices have to be documented and also the info must be available for audit or verification.

In line with these provisions, proper working order, including a safe and reliable navigation system, is to be established with shipping companies adopting the necessary measures both for identifying potential risks and for the constant upgrading of safety methods.

## **4. Evaluation of effectiveness and challenges in implementing the ISM code**

The ISM code's efficacy can be measured by the impact it has had on maritime safety, accident reduction, and the enhancement of e.g. management practices of shipping companies. The maritime industry, since the implementation of the ISM code, has experienced considerable safety management system improvements. Shipping companies are now more liable for their operations, and the compulsory SMS ensures that all safety factors are taken into account <sup>[3]</sup>.

## 5. Positive Outcomes

**Reduction in Accidents:** Around the onset of the ISM code provision the critical effort was to minimize safety accidents. Research conducted has shown that the application of safety management systems has accounted for fewer such accidents due to human error, which represented the majority of the cases of maritime incidents. For example, the Herald of Free Enterprise disaster was due to human error and the worrisome absence of safety management, which can be prevented with the code <sup>[4]</sup>.

**Environmental Protection:** The ISM code has also contributed to better environmental stewardship by the imposition of compliance with international environmental standards and the promotion of environmentally friendly technologies and practices.

**Standardization of Safety Practices:** The ISM code has set up a harmonized safety management platform for the entire shipping industry. This has led to a more mature safety system on the fleets of most global companies, thus the ships, flying different flags, are adopting the same standards.

## 6. Challenges

Despite its substantial positive influence, the ISM code has not been free from a few challenges.

**Compliance Costs:** For example, smaller shipping companies may be constrained in their financial capabilities to adopt the safety management systems that are required by the ISM code. The cost of coming up with, having, and maintaining an SMS can be quite sizable, especially for companies operating an older fleet <sup>[5]</sup>.

**Inconsistent Enforcement:** Although the ISM code is a mandatory support, there is a great difference among jurisdictions in applying it. Some countries may have weaker enforcement mechanisms, hence, counter-compliance may occur at certain operators, especially in developing countries or areas that have less regulation regarding shipping registries <sup>[6]</sup>.

**Complexity of Implementation:** The ISM code not only requires carriers to implement safety systems that are both complete and sometimes even intricate but to also manage them following the relevant operational procedures. For smaller companies, especially those with very limited resources, the task of aligning operations with the ISM code's requirements can be overwhelming.

**Human Factor:** While the ISM code gives utmost importance to human factors and resources, human error is still a main cause of maritime accidents. One of the chief concerns is whether safe work practices are always put into place in a timely fashion, especially in a rapidly changing maritime environment.

## 7. Predictions for the future of the ISM code

The ISM code is expected to undergo several changes in the future to deal with real-time challenges at sea. Some of the areas where updates might be needed are the following.

**Technological Advancements:** The ISM code is set to become an efficient document with the increasing use of digital tools such as AI, automation, and data collection in the shipping lines. Besides, the code should contain regulations for the incorporation of such digital technologies into ship management and automation in ships. A category for this could be the establishment of standards for cyber security, the rights of data privacy, and the safe use of automated vessels.

**Environmental Sustainability:** An increased focus on environmental sustainability and a deep aspiration to reduce carbon dioxide emissions will likely be the main propulsion of the future revision of the ISM code.

Accordingly, as the global environment gets stricter, more regulations may be included in the ISM code, so that the vessels meet the environmental standards that are kept up with the changes.

**Human Element in Safety:** The development of the ISM code will thus highlight the importance of recognizing that the human element in safety management is the key to the marine industry. Traditional practices like certification and training may need to have more orientation towards the welfare of the crew member, for example, mental health, and fatigue management, which are the cornerstones of human factor/accident reduction on-board.

**Global Compliance and Enforcement:** The International Maritime Organization (IMO) may strive hard to enforce penalties in the form of fines for shipowners who do not comply with the ISM code to ensure its worldwide implementation. One of the steps that should be considered is more thorough control through audits of ships and tougher penalties if they are non-compliant.

## **8. Recommendations**

**Enhanced Training Programs:** Training teams that are fundamentally safe for workers must include enhanced training programs, which are focused on skills like decision-making, stress management, and leadership, with technical skills.

**Integration of New Technologies:** The ISM code is the document that needs to be updated with the pertinent emerging technologies on automation and artificial intelligence because it is the one which has to include the latest updates on cyber security, data protection, and proper use of these technologies to ensure the new gadgets do not become a grave safety issue <sup>[7]</sup>.

**Stronger Enforcement:** The enforcement of the ISM code shall be enforced aggressively by the insurance provider and the third-party safety management firm which is hereby demanding the same standard to be done by other companies. International cooperation and the threat of heavier fines could make safety-compliant facilities a reality in the future <sup>[8]</sup>.

## **9. Conclusion**

The ISM code has seen a great change in safety in the sea. It has provided a way for shipping companies to safety risks be managed. Also, it has played a significant role in reducing both maritime accidents and marine environmental disasters. Furthermore, the issues of the financial burden, the enforcement, and the human factor, in short, are still in place. Hence, the ISM code is required to adapt to the changes to mitigate risks coming from the development of technology, the stricter environmental regulations, and the new factors brought forth by human beings. Thus, through the improvement of training, the introduction of new technologies, and the intensification of control, the ISM code will result in the worldwide maritime industry being secure.

## **Disclosure statement**

The authors declare no conflict of interest.



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# The Career Development of Slash Youth under the New Business Format: Analysis of Dilemma and Exploration of Countermeasures

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**Abstract:** With the rise of new forms of business, the group of slash youth is growing, and its career development has been widely concerned. This paper deeply analyzes the status quo and dilemma of the career development of the slash youth, such as the role conflict under the part-time work mode, the career development path being unclear, and the lack of protection of social security, rights, and interests. At the same time, it explores the corresponding countermeasures, including precisely planning the career path to strengthen the core competitiveness, optimizing the time management and role coordination strategy, and improving the social security and rights and interests protection mechanism. Through the discussion of the dilemma and countermeasures, the study aims to help the slash youth to better realize career development under the new business format and grasp the diversified development opportunities.

**Keywords:** New business form; Slash youth; Career development dilemma

**Online publication:** January 23, 2025

## 1. Introduction

The term “new forms of business” first appeared in the Communiqué of the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China (CPC) in 2015, which proposes to “promote the vigorous development of new technologies, new industries and new forms of business” and emphasizes “strengthening support for flexible employment and new forms of employment.” The 2016 Government Work Report further clarified that new business forms cover the Internet, the Internet of Things, cloud computing, e-commerce, and other fields. Some scholars further defined the concept of the new business form, pointing out that the “new business form” is based on the existing industrial foundation, relying on the innovation and application of information technology, derived service links, and activity forms that meet the needs of diversified, diversified and personalized products or services <sup>[1]</sup>. On the whole, the core features of new business formats are mainly

reflected in digitalization, platformization, and flexibility <sup>[2]</sup>. These characteristics together shape the unique development mode and employment ecology of the new business and have a profound impact on all aspects of youth employment.

In this context, as a new occupational group, the slash youth emerge and develop vigorously. Slashers generally refer to those young people who are not bound by a single professional identity, but who have diversified skills and interests in different fields, wear multiple professional identities, and have multiple sources of income. Their professional identities are often connected by “/”, such as “designer/photographer/psychological consultant” <sup>[3]</sup>. The rise of this group is not only an individual’s initiative to pursue self-value realization and meet the needs of economic diversification but also an inevitable product of social and economic evolution and industrial structure adjustment. According to the 2021 Youth Employment and Career Planning Report, 27.6 percent of young people now have two or more jobs, and “slashers” account for more than 25 percent <sup>[4]</sup>. According to the Social Survey Center of China Youth Daily, 11.1 percent of young people consider themselves “slash youth”, and nearly 50 percent of them have the desire to become “slash youth.” It can be seen that the scale of the slash youth group is continuing to expand. However, although the development of slash youth seems to be full of vitality, some scholars are concerned that they face many difficulties and challenges in their career development, such as the difficulty of work-life balance for slash youth, the imbalance of main and secondary occupations, and the forced work passion for secondary occupations, which leads to maladaptive outcomes <sup>[5]</sup>. There is also a high turnover rate of the main occupation, low career commitment, and low organizational citizenship behavior <sup>[6]</sup>. Therefore, it is of great practical significance and theoretical value to deeply study the career development dilemma of slash youth and explore effective countermeasures for promoting the healthy growth of slash youth, promoting the sustainable development of new business forms, and improving the social employment system.

To sum up, this study focuses on the career development dilemma of slash youth and puts forward targeted career development countermeasures and suggestions. Specifically around the following questions: What is the status quo of career development of slash youth? What practical dilemmas do they face? How should the dilemma be dealt with?

## **2. Review the status quo of career development of slash youth: Research design and implementation**

This study uses the in-depth interview method to select 15 young slashes from different industries and cities as research samples, aiming to deeply explore the working and living status of this emerging group. The selection of research samples mainly covers the following three key dimensions. First, focus on the slash youth under the age of 35, who are actively engaged in the parallel development of the main and secondary industries. Second, it focuses on those individuals who have shared their slash experience on social platforms, which not only ensures that they have a certain willingness to express themselves but also reflects the authenticity and richness of their slash experience from the side. Third, the study strives to present a wide diversity in the occupational types of the samples, covering different fields and occupations of different natures, to enhance the diversity and representativeness of the research results. In the specific research process, the author conducted an in-depth interview with each slash youth, with the interview duration limited to about 60 minutes, to ensure that they could comprehensively and systematically collect detailed information about their work experience, the motivation behind career choice, the difficulties and challenges they encountered, and many other aspects (**Table 1**).

**Table 1.** Respondent information table

Serial Number	Interviewee	Gender	Age	Primary and secondary occupations (primary/secondary)	Slash-job duration
1	Oceanic	Male	33	IELTS Teacher/content creator	3 years
2	Lily	Female	26	Dance instructor/health consultant	2 years
3	Tintin	Female	34	Hypnotist/stage actress/designer	8 years
4	Filigree	Female	33	Psychological counselor/college teacher	6 years
5	Sugar Sugar	Female	31	Internet clerk/parenting blogger/corporate consultant	3 years
6	Mr. Liu	Male	35	Photographer/interior designer	6 years
7	Miss Ho	Female	32	Homestay hostess/designer/hotel manager	9 months
8	Ms Lee	Female	27	Chinese teacher/online novel writer	5 months
9	Light snow	Female	29	Drawing teacher/graphic designer	1 month
10	Ann Tsai	Male	27	Physical education teacher/ground pick-up guide/hike leader	6 years
11	Siu Fong	Female	25	Study tour leader/consultant	1 year
12	Mr. Chen	Male	30	Taobao shopkeeper/aromatherapist/curator	1 year
13	Xiao Wang	Male	29	Photographer/fitness instructor	3 years
14	Xiao Mei	Female	23	Self-employed/network anchor	2 years
15	Mr. Gu	Male	32	Copywriter/Didi driver	4 years

### 3. Current status of career development of slash youth

#### 3.1. Career choice motivation: the exploration of personal development driven by diversity

##### 3.1.1. Interest-led: The professional transformation of hobbies

Through the analysis of the interview results of 15 slash youths, it is found that the motivations for their career choice can be mainly classified into three categories: deepening the field of interest, pursuing extra income, and realizing personal value. In terms of deep cultivation of interest fields, many slash youths develop their hobbies into sideline occupations, thus obtaining some kind of pleasure and satisfaction in their work. For example, the interviewee Ding Ding, who originally worked in an advertising company, tried hypnosis therapy due to work pressure. In the process of self-study, he developed a love for hypnosis, self-study, and research, and now he is a registered hypnotist. At the same time, he also works as a stage actress in a theater company and occasionally gets some acting opportunities. “I did it as a hobby. I did not want to do something on the side at the beginning. I just liked it and learned it. Later, some friends will gradually know that I will do hypnosis, find me to do activities, and become a side business, in fact, now these do not earn much, or when the hobby is done” (Ding Ding, August 2024).

##### 3.1.2. Economic pressure: Realistic consideration of increasing income from side business

In the pursuit of extra income, some slash youths choose to engage in side businesses that can bring more income due to greater pressure in life or to improve their economic level. For example, Miss He is a hotel manager. Although her job is relatively stable, she has begun to look for other ways to increase her income as the cost of living rises and her family’s consumption expenditure increases. Under the influence of the “slash” trend, she

became a homestay hostess, effectively increasing her income by running her own homestay on social media, sharing her design experience, and recommending related homestay products. “When you have a child, you have to spend money everywhere. Just because my hometown is a tourist area and my family has an empty house, I started to explore and do it little by little. The income from the boutique B&B in a summer tourist season income can cover our family’s living expenses for a year” (Miss He, 2024 May).

### **3.1.3. Value pursuit: The journey of ability expansion and self-realization**

In terms of realizing personal value, some slash youths hope to expand their ability boundaries by trying different career fields and realizing the improvement of self-value. For example, Xiao Wang, the interviewee, has been working as a fitness coach for 6 years. Now, besides being a fitness coach, he also undertakes some part-time photography for commercial activities. “At the beginning, I just wanted to improve myself. The fitness industry will soon become a leading industry. If I do not do this in the future, I will also have technology to support my family. In the past two years, I have gone out and met many friends, and my skills have also improved a lot, and I have indeed seen progress.” (Xiao Wang, 2024 August)

## **3.2. Career development model: Multiple explorations in balance and integration**

### **3.2.1. Dynamic balance of main and deputy positions: The coordinated development with the main position as the axis and the deputy position as the supplement**

In the process of career development, most slash youths are committed to seeking a relatively stable “dynamic balance” between the main job and the deputy job. They regard the main job as the main source of income and career foundation, and the second job as a useful supplement to enrich career experience and expand development space. Taking Tangtang, a parenting blogger, as an example, she regards the main job as the “main task” and the deputy job as the “side task.” When carrying out the side job, she has formulated a more detailed schedule, clarifying the time and task arrangement invested in the main job and the deputy job, to ensure orderly switching and collaborative development between them. Although at some stages, her income as a parenting blogger occasionally exceeded that of the main job, she always insisted that the main job was the “core.” University teacher Sisi, who also works as a psychologist, believes that the two jobs offer some flexibility in scheduling, which not only does not conflict in nature but can enhance each other. “My work schedule is relatively flexible. The two jobs are not in conflict and can be balanced well,” she said. “Working as a psychologist allows me to practice and expand my professional knowledge, which in turn helps me to better teach knowledge in the classroom. In other words, doing a side business is actually improving my professional ability” (Sisi, 2024 June).

In general, for most slashers, the main job is still regarded as the “axis” for them to settle down, while the secondary job is a supplement to the main job. The two form a dynamic balance. As one respondent said, “I do not want to develop my slash job into my main career. I want to maintain a balanced state without too many conflicts. Even if there are conflicts, I want to be able to control them.” (Ms. Li, 2024 July)

### **3.2.2. Multiple integration of professional identity: Cross-field integration to create unique value advantages**

In the process of career development, some slash youths have successfully realized the multiple integration of professional identity, and they skillfully integrate the skills, knowledge, and resources of different professions, thus creating unique values and significant competitive advantages. For example, Anzai graduated in leisure physical education and is currently working as a physical education teacher in a primary school. In teaching, he is



keenly aware of the market's interest and demand for outdoor sports and nature exploration. Therefore, he made full use of his professional knowledge reserve and extensive network resources, was actively involved in the field of outdoor activity planning, and undertook outdoor hiking planning and organization activities in the form of a studio. "It is difficult to break through the work in the school, so you should find more ways for yourself. Outdoor leadership is the best way to blend your major with your career" (Ann, 2024 July). This diversified and integrated career development model enables the slash youth to fully tap their potential, greatly expand the career development space, and create more possibilities and development opportunities in different fields.

## **4. Insight into the dilemma of career development of slash youth**

### **4.1. Role conflict: Multiple challenges under the part-time work mode**

#### **4.1.1. Limitation of time and energy: Coordination problem in busy work**

Slash youth often face the dilemma of limited time and energy due to the need to juggle multiple professional identities at the same time. Different occupations may have different working time requirements and task urgency, which often puts them in a dilemma when it comes to scheduling their daily work. "Sometimes it is really too busy, especially some projects are pressed by the party, and the construction period cannot be compressed anymore. My studio must grab the opportunity, before the winter and summer vacation enrollment, scheduling of classes that is not delayed, the two jobs are busy, the current time coordination is not flexible" (Xiao Xue, 2024 August); "Definitely want to open up the live broadcast, to learn to live will close the store, there is no time to learn, then if it is still easy to get up, maybe how to do? So now or try to take into account both, really take into account not to go" (Xiaomei, 2024 June).

#### **4.1.2. Role transformation and psychological adjustment: The physical and mental test of frequent switching**

Frequent transitions between different professional roles also put forward higher demands on the psychology and cognition of slash youth. To quickly switch from one working state to another requires them to have strong adaptability and psychological adjustment ability. "Doing aromatherapy and opening a Taobao store are completely two states, doing aromatherapy is still very relaxing, but you sometimes deal with a lot of things in the store it is difficult to enter the relaxed state, the transformation of identity is sometimes not easy for me" (Mr. Chen, 2024 June). In addition, being in a state of role conflict for a long time may also lead to negative emotions such as anxiety, exhaustion, and self-doubt among slashers, which will have adverse effects on physical and mental health. "You do not think being a blogger is easy, in fact, it is very difficult, many times I am waiting for the child to sleep and then cut video script, wishing to have three heads and six arms. Many times are very frustrated and do not know how others can do so many things. I do not know if I will have time to do this when I finish my maternity leave soon. I do not want to give up for the time being, but I feel that I will be depressed" (Tangtang, 2024 June).

### **4.2. Career growth path: Confused exploration and wandering**

#### **4.2.1. Vague planning: The uncertainty of career direction**

Different from the traditional single career development path, slashers are faced with more complex and diverse career choices and development directions, which makes them often feel confused and lost when making career plans. When choosing a side career, many slash youth often rely only on their personal interests or short-term economic interests, lack in-depth analysis and rational judgment of their own advantages, disadvantages, and long-

term career development goals, resulting in an unclear career development direction, easy to wander between different career fields, waste time and energy, and difficult to form effective career accumulation and growth. “I was originally doing interior design, then thinking of making more money, so I began to take photography work with my own interest in photography but found that photography is too competitive after doing it for some time, and I am not sure how to develop in the photography field, unsure whether to choose commercial photography or artistic photography, so now I am doing both, But I feel that there is no progress and I feel very confused” (Mr. Liu, 2024 July).

#### **4.2.2. Promotion dilemma: The inadaptability of the traditional path**

In the traditional workplace environment, employees can usually achieve career growth and development through clear promotion mechanisms, such as job promotion and salary increases. However, for slash youth, it is difficult to follow the traditional promotion path due to the diversity of their professional identity and the flexibility of their work forms. The development standards and evaluation systems of various side fields vary widely, and it is often difficult for slashers to measure their level of development and progress in various career fields, and it is not clear how to achieve further breakthroughs and promotions in different career directions <sup>[7]</sup>. This, to a certain extent, severely limits their motivation and confidence in career development and hinders them from moving forward to higher-level career goals. “In the field of fitness coaching, I know how to grow by running myself, but in the field of photography, I am currently agonizing over how to get more business opportunities and feel like I am walking in the dark” (Xiao Wang, 2024 July).

### **4.3. Social security and protection of rights and interests: Vulnerability and helplessness in risk**

#### **4.3.1. The dilemma of social security participation: The uncertainty of future protection**

The slash youth work in various forms, many of which are part-time and freelance work that cannot be as stable as the traditional full-time work to pay social insurance, such as pension insurance, medical insurance, unemployment insurance, and so on <sup>[8]</sup>. Some slash youth may not participate in or fully pay social insurance due to unstable income, lack of employer contribution channels, or lack of understanding of social security policies, which makes them lack the necessary social security support when facing pension, medical care, unemployment, and other risks, and may fall into economic difficulties, greatly increasing the uncertainty and insecurity of life <sup>[9]</sup>. “Last year I was hit by a tricycle on the way to part-time work, had a fracture and concussion, and lived in the hospital for a week, friends said I could report work-related injury insurance, but when I asked the part-time agency, people said part-time staff do not have this system, so I finally had to admit it was bad luck, after this matter, to tell the truth, I felt quite bad for the lack of social security” (Ding Ding, 2024 August).

#### **4.3.2. Rights and interests protection problem: The vulnerability of legitimate rights and interests**

In some slash occupations, especially in part-time, temporary work, or freelance projects, due to the lack of clear labor contracts and effective constraints of labor laws and regulations, the labor rights and interests of slash youth are extremely vulnerable to infringement <sup>[10]</sup>. For example, there may be problems such as unpaid wages by employers, overtime work without corresponding remuneration, and occupational safety cannot be guaranteed <sup>[11]</sup>. Moreover, because the work of slash youth is often highly flexible and autonomous, they may face difficulties in collecting evidence, cumbersome legal procedures, and the high cost of safeguarding their

rights and interests. As a result, they often choose to swallow their pride when their rights are infringed upon and cannot effectively safeguard their legitimate rights and interests. “When I was doing product promotion for a small company, despite verbally forming an agreement, after the work was done, the boss has been dragging not to pay, when I want to enforce my rights, at that time did not sign a contract, chat records those are not too complete, and the legal process is too troublesome, the cost is high, so I finally just forget it” (Ocean, 2024 June).

## **5. The countermeasures of career development of slash youth**

### **5.1. Optimize time management and role coordination strategies**

Slash youth first need to make a detailed plan, according to the corresponding work tasks, time nodes, and importance of each occupational identity, carefully plan the daily, weekly, and even monthly work arrangements, with the help of time management tools, while reserve flexible time to deal with emergencies, to ensure that all work is carried out in an orderly manner <sup>[12]</sup>. Learning to set priorities is also crucial, accurately distinguishing the primary and secondary work, giving priority to dealing with urgent and important things, avoiding spending too much energy on trivial matters, reasonably postponing or entrusting non-critical tasks, and concentrating on overcoming core work. In addition, establish clear work boundaries and designate dedicated space and time for different tasks, so that they can work without distractions and improve their focus and efficiency. In addition, it is necessary to strengthen psychological adjustment, help quickly adjust the mentality between roles, and enhance mental toughness.

### **5.2. Clarify career planning and expand promotion paths**

On the one hand, slash youths should carry out in-depth self-assessment and positioning, insight into their own interests and strengths and weaknesses, closely combine market demand and industry trends, comprehensively measure the direction of career development, anchor core competitiveness, and long-term goals, prudently choose side businesses, and ensure that all professional identities are related and mutually promoting <sup>[13]</sup>. On the other hand, it is of great significance to actively seek professional guidance, plan a clear path, and formulate targeted learning and growth plans. Through participating in training courses, and seminars, or integrating into the professional community, professionals and peers can exchange lessons and obtain rich career information resources <sup>[14]</sup>. At the same time, give full play to the advantages of diverse identities, explore opportunities for cross-integration in different fields, achieve cross-border innovation, transfer skills and experience from one place to another, shape unique competitive advantages, and expand promotion possibilities. They should also pay attention to building their personal brand and reputation. Through quality results, professional attitude, and active social interaction, they can enhance industry visibility and influence, attract more opportunities and resources, and pave the way for promotion.

### **5.3. Improve social security and rights protection mechanisms**

On the one hand, government departments and relevant institutions should strengthen the publicity and education of social security policy, popularize the knowledge of social security to the slash youth, enhance their awareness of participating in insurance, and make them clear about their rights and interests and ways of participating in insurance <sup>[15]</sup>. On the other hand, given the work characteristics of slash youth, it is necessary to innovate the way to participate in social security insurance, provide flexible and convenient programs, allow the choice of payment levels and insurance projects according to income, support the participation of individuals or through

industry associations, platform organizations and other collective forms of insurance, to ensure the breadth and sustainability of social security coverage. In addition, strengthen the enforcement of labor laws and regulations, optimize the labor supervision mechanism, strictly supervise employers, and severely punish illegal acts such as wage arrears, overtime work, and occupational safety, to safeguard the rights and interests of workers. Finally, efforts should be made to improve the ability to safeguard the rights and interests of slash youths and provide legal aid and rights protection training, such as setting up legal counseling hotlines and platforms to protect labor rights and interests.

In a word, it is not an overnight task to deal with the career development dilemma of slash youth. Among them, diversified development is the trend, time management is the key, and clear career planning is the guarantee. At the same time, all-round strengthening of social security and rights and interests protection system construction is the top priority. This process requires the slash youth themselves, the government, enterprises, social organizations, and other aspects to work together so that the slash youth can be at ease to display their talents, fully release the vitality of innovation, and inject a steady stream of power for the development of new business forms.

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# Exploration of Technical Motivation and Aesthetic Pursuit of Virtual Film Production

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**Abstract:** As a revolutionary technology in the field of film production, virtual film production has gradually changed the way of film production and aesthetic pursuit with the wide application of digital virtual images since the 1990s. This paper deeply discusses the technical motivation of virtual production, including the integrated application of digital technology, the innovation of the production process, and the creation of a real-time visual environment. At the same time, this paper also analyzes the dual dimensions of the aesthetic pursuit of virtual production — creating visual wonders and pursuing image authenticity. In specific cases such as Avatar and Mandalorian, the profound influence of virtual production on the development of the film industry is revealed, and the embodiment of digital technology aesthetics in virtual production is discussed, as well as its contribution to the ontology of film, the expansion of theme and the exploration of time and space.

**Keywords:** Virtual filmmaking; Technical motivation; Aesthetic pursuit

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## 1. Introduction

Virtual production, as a brand new way of film production, not only changes the traditional production process but also profoundly influences the aesthetic pursuit of films. This paper aims to explore the technical motivation and aesthetic pursuit of virtual production, to provide a useful reference for the future development of the film industry, and to provide film creators with more abundant creative means and broad creative space. Even if the audience has a high demand for the film, the film will meet it. In the pursuit of visual wonders, the film production will also pay more attention to the authenticity and delicacy of the image, which will let the audience have the feeling of being in the scene, thus promoting the development of the film industry to a higher level.

## 2. A new era of technological innovation and aesthetic exploration

Since the 1990s, digital virtual images have been widely used. This marks a new development direction of film

production, and the way of film production and shooting has undergone great changes. As film director James Cameron has said, “There is a revolution underway in the art and technology of visual motion picture production that is bringing about such profound changes in the way we make films and other visual media that we can only describe the emergence of a digital Renaissance.” In this revolution, the integration of digital virtual images brings a double aesthetic experience to the film: first, to create a variety of breathtaking visual experiences, fully stimulate the audience’s exploration desire and curiosity; Second, to maximize the pursuit of the truth in the details of the film, to meet the requirements of some detail-controlled audience. Although digital virtual images have a century-long history in movies, it is the 2009 film *Avatar* directed by James Cameron that really attracted the attention of the world. It brought a whole new way of filmmaking and the concept of “virtual film production” into the film industry. The next decade brought even greater breakthroughs in filmmaking. In 2019, at SIGGRAPH, the top annual conference of computer graphics of the Association for Computing Machinery, a demonstration video integrating “virtual LED set” and “in-camera special effects” made an amazing appearance, showing a new production process that was completed simultaneously in shooting and post-production, marking the arrival of the era of “completely virtual production.” The first season of the American TV series *Mandalorian* using virtual production technology was also born this year, which aroused the attention and hot discussion of the film industry around the world, which will also see the influence of virtual production in real image production. Nowadays, virtual production has been integrated into film production, as it not only has a profound impact on the direction and mode of film production but also become an important force to promote the development of the film industry.

### **3. The challenge of virtual production**

First, to build a fully functional virtual production environment, the film studios not only need to be equipped with high-performance computer software to deal with massive data, complex scene rendering, character animation, real-time synthesis, and other work but also need to use rich creative options and fine control means so that creators can freely exert their creativity in the virtual environment. It is also necessary to establish a complex and stable network connection system so that the data can be transmitted and processed in a high-speed environment, and at the same time, it can meet the requirements of collaborative creation. All of these require high investment, but this is just the beginning because, with the continuous progress of technology and the increasing demand for film production, the studios also need to regularly upgrade and maintain the virtual production environment to ensure that it can always maintain the leading technical level and excellent performance.

Second, the use of virtual film production requires creators to deeply understand the principles and methods of computer science. To effectively use computers to build and render, they need to be able to convert 3D models into realistic 2D images, which requires users to understand some knowledge of graphics and have rich experience in events. Film art is a discipline that integrates literature, drama, music, and other art categories, which needs its strong innovation ability and can give profound connotation to the transformation of virtual scenes and characters.

Third, when creating very realistic scenes and characters, virtual film production often faces the major challenge of how to maintain coherence and realism in dynamic interaction, especially in the field of character animation, how to make the actions and expressions of virtual characters natural and smooth and achieve the realm of consistency with the performance of real actors is the main problem to be considered. Moreover, this highly realistic virtual environment also brings new problems to the audience’s perception: on the one hand, it will make the audience confused between the immersive experience and the real, and it is difficult to clearly distinguish the

virtual and the real; On the other hand, if the virtual element and the real element are not properly integrated, it will produce visual disharmony and awkwardness, and then make the audience have a bad viewing experience <sup>[1]</sup>.

## **4. The new realm of aesthetics driven by real-time and interactivity**

The emergence of virtual production technology has not only reshaped the process of film creation but also profoundly affected the aesthetic pursuit of film art. Because, the core of virtual production lies in its technical motivation — real-time and interactive, which together build the technical driving force of pursuing the sense of presence shooting, and promote the innovation and leap of film production technology.

### **4.1. Real-time: Capture every wonderful moment**

One of the highlights of real-time virtual production technology, it allows the film production team to instantly preview the virtual scene and special effects on the scene, mainly reflected in the capture of action and scene rendering can shorten the time of post-production, and improve the efficiency of production. Take the Avengers movie series as an example, in the process of shooting this movie series, the actors wear motion capture suits and perform in the virtual studio <sup>[2]</sup>. With the help of virtual production technology, the film team accurately recorded the actors' movements and expressions through real-time motion capture and rendered them into the virtual scene in real time. In this way, the director and production team can watch the effects of the virtual scenes and special effects on the scene, so that the shooting plan can be adjusted in time to capture every wonderful moment. Real-time performance will not only improve the efficiency of production but also allow the film production team to capture the best shots on the set, shooting many shocking battle scenes and special effects shots.

### **4.2. Interactivity: Building an immersive creation environment**

Virtual production technology also has the feature of interactivity, which allows film production teams to freely create and modify in a virtual environment, thus breaking the boundary between pre-shooting and post-production in traditional film production. Take Ready Player One as an example, during the production of this film, the director required the film team to adjust the scene layout, character modeling, and special effects at any time according to the needs of the plot, to achieve the interactive construction of virtual production technology, so that the audience can be placed in a fantasy game world, become the protagonist of the film, and experience thrilling adventures and challenges with the characters. With the help of virtual production technology, the film production team can be more free to create and modify the work, showing a more shocking and imaginative visual effect <sup>[3]</sup>.

## **5. Technical motivation and non-linear production process and virtual aesthetic leapfrog**

### **5.1. Technical motivation: From linear to parallel production process**

From original film photography to today's digital virtual production, film technology has been advancing and pushing cinematic art forward. The technological impetus for virtual filmmaking stems from the desire for more efficient and flexible production processes. In traditional filmmaking simulations, pre-shooting and post-production are two distinct stages, with a distinct divide. However, in today's era of virtual production, this boundary has been completely broken, because it is based on an unreal engine and LED background wall of virtual production, which will make the whole process of the non-linear characteristics, blurring the boundaries

of pre-shooting and post-production. Take *Interstellar* as an example, director Christopher Nolan uses LED background walls and virtual photography technology to preview virtual scenes and special effects on the spot in real time, improve production efficiency and shorten the time of post-production, so that the director can present perfect visual effects in the process of shooting. Virtual production technology will not only change the production process but also have a subversive impact on the production mode of traditional visual effects films, making film production more flexible and efficient <sup>[4]</sup>.

## **5.2. Aesthetic pursuit: Aesthetic leap from reality to virtual**

In traditional film production, the pursuit is often a realistic aesthetic, focusing on restoring the scene and atmosphere in real life. Compared with the virtual production era, people will find that it pursues the leap from reality to virtual. Take “*Avatar*” as an example. In the world of this film, the audience can feel unprecedented visual impact and aesthetic experience, because they create many fantastic scenes and characters, which break the restrictions in the real world and open a new aesthetic dimension. Because of virtual production, the pursuit is the relationship between the virtual and the real and lets the audience get a better experience.

## **6. Explore the reality of image: the trajectory of the aesthetic pursuit and technological evolution of film**

Take *Interstellar* as an example, although the “film space-time interweaving technology” it uses is slightly abstract when showing the vast universe and multi-dimensional space, Christopher Nolan’s team skillfully guides the audience’s attention from the sense of abstraction to the wonder of the mystery of the universe with its unique visual narration, such as the visual wonder of wormhole crossing and the time warping effect at the edge of the black hole. *Life of Pi* goes a step further, with most of the film’s scenes and Pi’s maritime adventure partner, Richard Parker, a Bengal tiger, created by computer-generated imagery (CGI) with a level of detail that makes the audience feel as if they have personally experienced a thrilling ocean journey <sup>[5]</sup>. These masterpieces demonstrate the relentless exploration of cinematic aesthetics in the pursuit of photorealism. Photorealism is not only reflected in the fine carving of CGI elements but also in the digital simulation of natural phenomena and emotional depth that are difficult to capture in real shooting. In traditional film aesthetics, the integration of virtual and live-action elements often faces challenges, and it is difficult to accurately convey the delicate emotion and dynamic beauty of live-action shooting. However, modern film technologies, such as motion capture and expression capture, enable the animal characters in *Zootopia* to show rich facial expressions and smooth movements, as if the characters have real vitality, and the audience can feel profound emotional resonance. These innovations not only show the ability of virtual production technology to obtain realistic images but also reflect the profound pursuit of film authenticity. From the perspective of aesthetics, there are two concurrent aspects of film aesthetics — digital technology aesthetics and documentary aesthetics. Although virtual film technology seems to challenge traditional aesthetics, in fact, it is a new form of reflecting life or reproducing real life scenes. Digital technology aesthetics and documentary aesthetics not only expand the aesthetic form of film together but also open up a new aesthetic road for the creation of images in the digital age. In the restoration and presentation of images, because of the collision between the nature of spectacle and the nature of reality, the aesthetic meaning of virtual production technology constantly pursues the sense of reality of images that “imaginary objects” are generated. This makes the whole world a beautiful scene so that people’s needs are more and more satisfied. The film world also constructs a series



of beautiful scenes that gradually meet the audience's growing diversified needs, and then promote the virtual production technology in the technical innovation and aesthetic concept of double progress and development.

## **7. Cross-cultural communication and integration**

The popularization and standardization of virtual production technology will inject a strong cross-cultural communication and cooperation ability into global film and television. This can break the regional restrictions so that different countries and regions of the production team can carry out deep cultural exchanges and integration, to promote the diversified development of film art. Take the Sino-US co-production of the film *Megalodon* as an example. The Chinese team and the US team participated in the planning, shooting, and post-production of the film, and virtual production technology was an important bridge between the two sides. The technology was used to create a virtual deep-sea environment, and computer simulations of *Megalodon* and other Marine creatures were also made. This allows artists from China and the United States to give full play to their creativity and expertise, and create film images that meet international aesthetic standards and have distinct cultural characteristics. The design of *Megalodon*, for example, combines Chinese cultural elements with American science fiction ideas; The setting of the plot and the shaping of the characters also integrate the cultural elements and values of China and the United States. Production teams from the two countries have also worked together to develop an efficient virtual production process. Cross-cultural cooperation and communication between film production teams can enable them to have a deeper understanding of the cultural characteristics and market needs of different countries and regions, to create film works that are more in line with the tastes of international audiences. These works can not only obtain higher box office revenue and word-of-mouth evaluation worldwide, but they can also convey the unique charm and values of different cultures in the process of cultural exchanges, and enhance the understanding and friendship between people of different countries.

## **8. Concluding remarks**

In the exploration of the motivation of virtual production technology and aesthetic pursuit, the author found that every leap in technology is opening up a new world for film art. Virtual production not only subverts the traditional production mode but also leads film creators to cross the familiar creative boundary and step into a new creative era. From virtual production to visual virtual production, it is not only the continuous innovation of technology but also the realization of real-time interaction between creators and actors, so that "what you see is what you get" has become the new normal of film production. In the entanglement between the virtual and the real, the form of the film and the real demand play games with each other, and jointly deduce a new aesthetic form, so that the virtual image blooms wonderful charm in the extreme reality. However, the prosperity of technology should not cover up the pursuit of a sense of reality. As a unique audio-visual art, the film should seek the true meaning of beauty in the pursuit of truth, touch people's hearts with realistic image narration, and convey profound thinking. This is the future way for virtual production to lead film creation.

## **Disclosure statement**

The author declares no conflict of interest.



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# The Mission and Responsibility of Ideological and Political Education in Universities during China's Modernization Process

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**Abstract:** This paper explores the evolving mission and responsibility of ideological and political education (IPE) in universities during China's modernization process. The paper examines the historical and theoretical foundations of IPE, highlighting its importance in fostering Chinese identity, moral values, and social responsibility among students. The study reviews challenges such as globalization, technological disruption, and cultural shifts, emphasizing the need for innovative approaches. Through case studies of leading Chinese universities, the paper demonstrates practical strategies for integrating IPE into academic curricula and digital platforms. The conclusion provides recommendations for enhancing the role of IPE in shaping future generations aligned with China's modernization goals.

**Keywords:** Ideological and political education (IPE); Modernization; Chinese identity; University education

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## 1. Introduction

### 1.1. Historical context

China's modernization process has undergone several transformative stages, beginning with the reform and opening-up policies initiated in the late 1970s. These reforms led to unprecedented economic growth, technological advancement, and structural changes in society<sup>[1]</sup>. However, alongside these achievements came a range of ideological challenges, such as the increasing influence of Western liberalism, the rise of individualism, and the diminishing prominence of traditional Chinese values. In this context, ideological and political education (IPE) has become an indispensable tool for ensuring that the values of socialism with Chinese characteristics remain central in shaping Chinese identity.

Modernization has also introduced complexities that require a recalibration of traditional educational practices. While modernization has brought material progress, it has also created ideological tensions, as rapid

globalization exposes young generations to diverse cultural and political perspectives. The evolving ideological landscape necessitates a robust framework of education that not only aligns with Chinese development goals but also provides students with the critical thinking skills and moral compass required to navigate a rapidly changing world <sup>[2]</sup>. IPE in universities stands at the forefront of this effort, tasked with instilling and promoting Chinese identity and cultivating a generation that is ideologically and politically sound.

## **1.2 The role of universities in modernization**

Universities are not only centers of academic learning but also critical platforms for ideological formation and value dissemination. As hubs for innovation and intellectual development, they are uniquely positioned to address the dual demands of modernization. Fostering economic growth and technological innovation on one hand, and promoting ideological stability and cultural preservation on the other. In China's modernization process, universities are entrusted with the mission of producing individuals who are not only skilled professionals but also socially responsible citizens equipped with a strong sense of Chinese identity and global competence <sup>[3]</sup>.

IPE within universities plays a central role in bridging the gap between education and strategy. As China pursues its goals of building a modern socialist society, universities are tasked with aligning their educational objectives with broader state priorities, such as achieving high-quality development, strengthening Chinese identity, and advancing development. This mission is particularly significant given the rising influence of social media and digital technologies, which have reshaped how young people engage with ideological content. Therefore, universities must innovate their approaches to IPE to make it more relevant, engaging, and impactful in the digital age.

## **1.3. The dual significance of IPE in the modernization process**

The significance of IPE extends beyond the classroom, as it serves as a cornerstone of China's long-term development strategy. By nurturing a generation that is ideologically aligned with Chinese goals and capable of addressing the challenges posed by modernization, IPE helps to ensure the sustainability of China's development model. At the same time, it also equips students to critically engage with global issues, such as climate change, technological ethics, and cross-cultural communication <sup>[4]</sup>.

## **2. Literature review**

### **2.1. Theoretical foundations of ideological and political education**

IPE in China is deeply rooted in Marxist principles, which emphasize the integration of ideology, morality, and practical application. The historical influence of Confucian values, such as loyalty, filial piety, and moral responsibility, continues to shape IPE frameworks, blending traditional philosophy with modern ideological needs.

Recent scholarship highlights the need to adapt Marxist and Confucian frameworks to contemporary challenges, incorporating critical thinking, technological advancements, and global perspectives <sup>[5]</sup>.

### **2.2. Challenges of modernization to IPE**

Globalization and Western ideologies: The rise of Western liberal values poses a challenge to maintaining ideological coherence in a globalized world.

Cultural shifts among youth: Modern students are more influenced by consumerism, social media, and individualism, which can dilute traditional ideological values <sup>[6]</sup>.

Technological disruptions: The digital age requires new tools and approaches for disseminating ideological content, such as gamification, virtual reality, and social media engagement.

### **2.3. Role of universities in the development plan**

IPE is not only an educational practice but also a component of the strategy. Recent policies, such as the chairman of the CCP's Thought on Socialism with Chinese Characteristics for a New Era, emphasize the role of education in achieving identity reconstruction. Universities are tasked with translating these high-level strategies into practical, student-focused initiatives <sup>[1]</sup>.

## **3. Case studies: Practical applications of IPE in universities**

### **3.1. Case 1: Fudan university's digital transformation in IPE**

Objective: To utilize digital platforms to make IPE more engaging and accessible.

Implementation: Fudan launched an online IPE portal with interactive content, gamified lessons, and live discussions. Social media campaigns encourage students to participate in discussions about contemporary ideological challenges.

Outcome: Increased participation rates, greater student satisfaction, and deeper ideological understanding among students.

### **3.2. Case 2: Rural universities addressing local modernization needs**

Objective: To connect ideological education with regional development challenges.

Implementation: Agricultural universities incorporate rural revitalization themes into IPE curricula, encouraging students to participate in community development projects.

Outcome: Students develop a sense of responsibility toward their communities while gaining practical experience in addressing modernization challenges.

## **4. Discussion: The mission and responsibility of universities**

### **4.1. Strengthening Chinese identity**

IPE must ensure that students develop a strong sense of identity, rooted in Chinese culture and history while understanding their role in contributing to development.

Practical actions: Organizing cultural heritage activities, promoting traditional festivals, and encouraging research on Chinese history and culture.

### **4.2. Promoting ideological innovation**

Modernization requires IPE to evolve from traditional lecture-based teaching to interactive, student-centered learning models.

Develop interdisciplinary courses combining ideology with science, technology, and arts. Incorporate real-world applications of ideological education, such as community service and project-based learning.

### **4.3. Fostering global competence**

While emphasizing Chinese identity, universities must also prepare students to engage with global challenges,

fostering skills such as cross-cultural communication and ethical reasoning. Offer courses on global governance, interethnic relations, and comparative political systems.

#### **4.4. Addressing ethical challenges in modernization**

Modernization brings ethical dilemmas related to technology, the environment, and social inequality. IPE must equip students to navigate these challenges with integrity.

Examples: Teaching ethical frameworks for AI development, fostering sustainable practices, and encouraging dialogue on social justice.

#### **4.5. Expanding inclusivity in ideological education**

IPE must address the needs of a diverse student body, including interethnic students and those from various socio-economic backgrounds. Develop multilingual materials, create inclusive curricula, and provide platforms for open dialogue.

### **5. Conclusion**

#### **5.1. The core mission of IPE in modernization**

The mission of IPE in universities is multifaceted, encompassing the cultivation of moral integrity, identity, and a sense of collective responsibility. It is tasked with instilling in students the values of socialism with Chinese characteristics while preparing them to adapt to the demands of modernization. By fostering a deep understanding of the development goals and aligning individual aspirations with societal needs, IPE provides a framework for young people to navigate the complexities of the modern world. This dual focus on individual development and priorities ensures that students are not only career-ready but also ideologically sound and morally grounded.

#### **5.2. Addressing the challenges of modernization**

The process of modernization presents a unique set of challenges for IPE. Globalization has introduced competing ideologies and cultural perspectives that often conflict with traditional Chinese values. Similarly, the rise of individualism, consumerism, and digital culture has reshaped how students engage with ideological content, requiring new and innovative approaches to IPE. Universities must address these challenges by creating curricula and pedagogical strategies that are relevant, engaging, and adaptable to the needs of the modern student.

The rise of technological advancements, particularly in the fields of artificial intelligence, social media, and digital communication, also demands a rethinking of traditional IPE practices. As this paper has shown, universities such as Fudan and Tsinghua have begun to leverage digital tools to make ideological education more accessible and interactive. These practices demonstrate that IPE must evolve alongside technological and societal changes to remain effective in achieving its goals.

#### **5.3. Practical contributions of IPE to development**

One of the key responsibilities of IPE is to align student development with the broader goals of China's modernization. By fostering innovation, critical thinking, and social responsibility, IPE contributes to the development of a workforce capable of addressing economic, technological, and cultural needs. Furthermore, through initiatives such as community-based projects and interdisciplinary education, universities can connect ideological learning with practical applications, ensuring that students understand the real-world implications of



their education.

The success of programs such as those implemented at regional universities in addressing local modernization needs highlights the potential for IPE to contribute directly to development. By integrating local concerns, such as rural revitalization and environmental sustainability, into ideological education, universities can ensure that their graduates are prepared to contribute meaningfully to their communities.

## Disclosure statement

The author declares no conflict of interest.

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# The Practice and Promotion Pathways of Age-Friendly Communities in Chengdu City: A Case Study of Gaojia Community, Dafeng Sub-district, Xindu District

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**Abstract:** As the aging process accelerates, the issue of elderly care is receiving increasing attention, among which the construction of age-friendly communities has improved China's elderly care system. The article first combs through the concept of age-friendly communities and the theoretical connotations of constructing age-friendly communities both domestically and internationally. Through research on the Gaojia Community in Dafeng Sub-district, Xindu District, Chengdu, which was rated as an age-friendly community in 2021, it was found that the development path of Gaojia Community as an age-friendly community is as follows: leading with culture to create a community, fostering a harmonious and supportive atmosphere for the elderly; being good at utilizing surrounding resources to build a base for conveying concepts; improving the environment with both soft and hard aspects, focusing on creating spaces suitable for the elderly; exploring the application of digital devices to identify needs and provide precise assistance to the elderly; closely focusing on aging in place, exploring and innovating governance models; and linking various stakeholders to emphasize participation, helping to build a shared community.

**Keywords:** Age-friendly communities; Elderly services; Aging in place

**Online publication:** January 23, 2025

## 1. Introduction

As the global aging issue becomes increasingly severe, the construction of age-friendly communities has become a hot topic of research<sup>[1]</sup>. By the end of 2021, the population of people aged 60 and above in China reached 267 million, accounting for 18.9% of the total population; the registered elderly population in Chengdu reached 3.208 million, accounting for 20.61%, both higher than the national average. Aging is a significant challenge faced by China, with most elderly people preferring to age in place, which raises higher demands for community facilities

and services suitable for the elderly <sup>[2]</sup>. In 2005, the 18th IAGG World Conference proposed the initiative for age-friendly cities, and the World Health Organization subsequently promoted the global age-friendly cities project. From 2006 to 2007, opinions from elderly people in 33 cities worldwide were collected to formulate the “Global Age-Friendly Cities: A Guide”, which promotes the development of distinctive age-friendly policies and diverse city models in various countries. By September 2018, the number of members in the global age-friendly cities and communities network had increased from 11 to 760. In recent years, age-friendly communities have become a new trend in aging policies, aiming to meet the community service needs of the elderly and address the challenges of aging. In 2017, China issued a notice requiring the improvement of evaluation standards for the construction of age-friendly living environments and launched demonstration actions for the construction of “age-friendly cities” and “age-friendly communities.” Subsequently, places such as Shanghai and Zhejiang have introduced relevant policy plans. In 2020, China initiated the creation of age-friendly communities, and from 2021 to 2022, 21 communities in Chengdu were rated as national model age-friendly communities.

## **2. The concept of age-friendly communities and its theoretical connotations**

Currently, there is no unified terminology for “age-friendly communities” both domestically and internationally, with common terms including “age-appropriate communities”, “elderly-adapted communities”, “senior-friendly communities”, “retirement communities”, and “all-age communities”, among others <sup>[3]</sup>. Scholars such as Menec and Vahne believe that the “AdvantAge Initiative”, launched at the end of the 20th century, defines an age-friendly community as one that meets four objectives: (1) fulfilling basic needs (such as housing, safety, and service information); (2) promoting social and civic engagement; (3) striving to improve physical and mental health and well-being; (4) maximizing the independence of frail and disabled individuals by providing accessible transportation and support for families and other caregivers <sup>[4-8]</sup>. In 2000, the American Association of Retired Persons (AARP) defined it as a community that includes affordable suitable housing, comprehensive community functions and services, and a variety of transportation options <sup>[9]</sup>. The Age-Friendly Communities (AFC) initiative believes that its purpose is to promote the physical and psychosocial health of elderly residents and improve the overall quality of life in the community, a place where the elderly actively participate, are valued and supported, and where the infrastructure and services can effectively meet the needs of the elderly <sup>[9]</sup>. In 2007, the World Health Organization defined it as a community that improves the quality of life for the elderly by providing health care, social participation, and safety services and encourages the realization of active aging <sup>[11]</sup>.

Scholars such as Liebig and Poon believe that age-friendly communities make local resources more “user-friendly” for the elderly, thereby maximizing the benefits that services, programs, policies, and facilities provide to the elderly and their families through convenience and support. Murray suggests that age-friendly communities should not only be suitable for the elderly but should cater to all age groups <sup>[12]</sup>. Some domestic scholars believe that the concept of “age-friendly communities” is a response to the elderly’s preference for “aging in place.” Similarly, domestic scholars such as Li Xiaoyun also believe that age-friendly communities are not just friendly to the elderly but are friendly to all ages <sup>[13-14]</sup>. Cao Fengjuan et al. argue that under the influence of the theory of active aging, age-friendly communities emphasize the value creation and identity recognition of the elderly in the process of social development, encouraging the elderly to fully utilize their potential and autonomy, and actively participate in the community <sup>[15]</sup>. This is not only friendly to the elderly but also a full-age-friendly community that promotes intergenerational harmony and interaction. The World Health Organization, in its publication “Global Age-

friendly Cities: A Guide”, has identified three major aspects of age-friendly cities (physical environment of the city; sociocultural environment; health, social environment, and services) and eight themes (outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, community participation and employment, communication and information, community support and health services), and the creation of age-friendly communities mainly revolves around these aspects and themes.

### **3. Development pathways for Gaojia community in Xindu district**

Gaojia Community is located in Dafeng Sub-district, Xindu District, Chengdu, and is one of the 13 rural communities. It covers an area of about 1.7 square kilometers and includes 7 residential groups. With the inclusion of the population from outside, the total population of the community is about 45,000 people, among whom there are 2,200 people aged 60 and above, accounting for more than 22% of the total population, and about 70 people aged 80 and above. In 2021, Gaojia Community was named a “National Model Age-Friendly Community in 2021.” During the creation process, Gaojia Community fully leveraged its cultural heritage advantages, integrated resources, encouraged resident participation and explored a creation model with distinctive Gaojia cultural characteristics.

#### **3.1. Culture leads community creation to create a harmonious elderly-friendly atmosphere**

During its development, the Gaojia community has undergone several territorial integrations. To promote effective integration between the local residents and the incoming population, the Gaojia community has rooted itself in the local “home” culture, adopting the cultural theme of “Noble and Upright, Family Full of Great Love.” Based on Limin Road, it has created a themed street called “The Way Home”, encouraging mutual assistance among community residents to build a warm and friendly community atmosphere and a culture of respect for the elderly. The “home” culture is integrated into the lives of community residents through distinctive activities and environmental design.

Furthermore, the community has established a basic information database and a weekly meeting system. In response to the demands of the public, it assigns specific people, responsibilities, and timelines to ensure that every matter is addressed. For instance, in the Greenland City residential area, where the proportion of non-local residents reaches 76.6%, the community has organized “Sunshine Afternoon Tea” and other ice-breaking activities, established public spaces such as mobile vegetable gardens and fitness areas, and incubated self-organizations like “Baking Time” to create a “24/7, all-age, doorstep” social space, helping residents to break down barriers.

#### **3.2. Skilled use of surrounding resources to build platforms and convey concepts**

Gaojia community fully leverages its spatial advantage of being close to the sports venues. It sets up promotional slogans along the streets and on exterior walls, establishes cultural stations, and creates “sports” and “health” themed streets to convey the concepts of “Everyone should exercise” and a healthy, positive lifestyle to residents. In addition, the Gaojia community makes good use of its spacious area to create open public activity spaces. For instance, a square is built near the kindergarten, where children can play after school. At the same time, facilities such as basketball courts and ping-pong tables provide opportunities and spaces for leisure and entertainment for people of all age groups.

In terms of platform integration, the practice station consolidates various resources and coordinates efforts

from all sides to set up functional rooms such as a convenience service room, multifunctional meeting room, dance room, children's area, calligraphy and painting room, cultural and creative area, book pavilion, and outdoor activity square. It constructs a comprehensive civilized practice platform that integrates educational services, health and wellness, theoretical propaganda, peace and rule of law, fitness and sports, community convenience, science popularization, and cultural services.

### **3.3. Combining soft and hard measures to improve the environment, focusing on creating spaces suitable for the elderly**

In recent years, the community has established a home-based elderly care service center, built a day-care center, a cultural activity square, and a health walkway. It has also set up elderly activity rooms, a library, cultural and artistic activity rooms, and a card room, and established eight community elderly cultural and sports teams such as Tai Chi and square dancing, carrying out a variety of colorful leisure activities. At the same time, for special elderly people such as the elderly and those with disabilities, the community actively carries out geriatric transformation. It regularly visits their homes every month to conduct safety inspections of water, electricity, and gas facilities and provides long-term health education, safety training, legal publicity, and other educational activities for the elderly. It shows concern, warmth, and comfort to the elderly, and guides them to contribute their remaining energy to grassroots governance, ensuring that the elderly are well cared for, happy, and active.

Gaojia community uses rest chairs, safety handrails, and barrier-free walkways to connect transportation services and create a safe and convenient environment for the elderly to go out. For example, on the riverside street of Gaojia community, there is a love seat every 10 meters, with the slogan "Rest if you're tired" on the seat, ensuring convenient and comfortable travel for the elderly.

### **3.4. Exploring the application of digital devices to identify needs and provide precise assistance to the elderly**

Gaojia community actively explores the application of smart elderly care service systems. The elderly wear monitoring bracelets and the system's backend monitors health information such as blood pressure, heart rate, and blood sugar in real-time, synchronizing the information to the family members' mobile phones. This provides comprehensive monitoring of the elderly's health status, enabling timely response to emergencies. At the same time, the community dispatches volunteers to help the elderly learn to use smart devices.

The community establishes a "1 + 1" pairing volunteer service database for the elderly, creating service need files for the elderly they serve. Through these need files, volunteers organize "one-on-one" home visits for elderly people who are alone and elderly families who have lost their only child, among others. The service content includes: cooking and cleaning in the home, checking home safety, measuring blood pressure and blood lipids, shopping on behalf, daily companionship, psychological comfort, and spiritual care. For example, in the homes of elderly people living alone, younger volunteers accompany them in chatting and listening to their hearts, reducing their sense of loneliness and helping them realize their personal value after retirement.

### **3.5. Categorizing volunteer teams and incentivizing resident participation with "hours"**

Led by resident leaders, the community has developed a volunteer force of over 400 people. Currently, the community has organized 12 volunteer teams, each with its own distinctive flag and corresponding service content, such as the "Old Friends" Volunteer Service Team and the "Rhythm" Service Team. Community residents



can choose to join the team that aligns with their strengths and interests. Through neighborhood mutual assistance and interaction, the community has encouraged more nearby volunteers who are willing to participate in “younger serving older” volunteer services. This pairing of younger volunteers with older adults promotes the younger elderly to stay active and engaged in volunteer work while ensuring that the older elderly are well cared for through the services they receive. To date, the community has “paired” 49 couples, an increase from the initial 20 pairs.

In addition, the community has established a “Time Bank” system, which provides precise records of service hours, content, and feedback for volunteers after their service is completed. Residents can exchange accumulated service hours for necessities such as rice, flour, and oil, or enjoy free volunteer services provided by others. The “Time Bank” system has been implemented in the Gaojia Community for six years and has effectively motivated residents to participate actively.

Community Staff A: “The community has grown from just over ten volunteers to more than 400 now. Many young people and elderly individuals are joining our volunteer ranks, making our volunteer team quite large. During the pandemic, the volunteers were very enthusiastic, and afterward, the community issued certificates of honor and prizes to residents who participated in volunteer services.”

Resident B: “I mainly work shifts at the Gaojia Community Service Center. We have people taking turns, so the working hours are relatively flexible. As a volunteer, there is no salary, but the community records the volunteer hours in the “Time Bank.” This credit can be used to exchange for things like rice, flour, and oil. When I’m older, I will also be able to enjoy volunteer services provided by other elderly people.” (The information is sourced from interviews conducted during the research period.)

### **3.6. Closely focusing on aging in place to explore innovative governance models**

In practice, the Gaojia community has gradually explored a “2+4+N” elderly service model. This model begins with the development of both software and hardware aspects as the foundation, then constructs a four-linkage operation mechanism that can achieve protection, collaboration, evaluation, and supervision. Finally, with the support of infrastructure construction and operational mechanisms, the community leverages its advantageous resources, including the enthusiasm of the elderly to participate in community activities, the development and vitality of community self-organizations, the continuous provision of community social worker services, and the harmonious neighborhood relationships among community residents. This encourages the elderly in the community to actively participate in a variety of community resident activities, forming a “2+4+N” implementation model.

Specifically, under the coordinated leadership and converging role of the community’s “large Party committee”, focusing on “aging in place”, the community relies on the Party-mass service center, community day-care center, neighborhood spaces in residential areas, and public spaces in building corridors, totaling more than 2,500 square meters of infrastructure, to build service platforms. At the same time, through the linkage of the community, social organizations, and various social forces, multiple elderly service teams are established. This fully connects and integrates the strengths of various parties, collects and classifies service needs, builds linkage platforms and collaboration mechanisms, combines activities with care, and provides targeted services. This covers approximately 5,000 residents, gradually improving the quality of life for the elderly in the community.

### 3.7. Collaborative entities focus on participation to aid in shared community construction

Under the concept of a “shared community”, the Gaojia community actively explores localized models, linking resources from dozens of social enterprises such as Yuanrong Health and Wellness Studio, Guicheng Rural Bank, Ultimate Dance, and Zhijia Academy. They have established a “neighborhood station” that integrates multiple functions such as learning and leisure. The station includes “two rooms, two stations, and one center”: a dispute resolution room, a grid worker studio, a convenience service station, a social organization workstation, and a party-mass activity center. It also features several shared functional areas, such as a library, meeting room, and children’s area, aiming to provide residents with precise, close-to-home, and considerate convenience services. During the construction of the neighborhood station, community workers and resident leaders fully mobilized the broad community members to contribute ideas and suggestions for the station’s development. In the subsequent operation, this approach will be continued, gradually transferring the management of the space to the residents, enhancing their capabilities, and truly achieving co-governance and sharing.

### Disclosure statement

The author declares no conflict of interest.

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# Exploration of the Development Path of Dubbing Industry in the Era of Intelligent Media

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**Abstract:** With the rapid development of intelligent media technology, the demand for high-quality dubbing in fields such as film and television dramas, animation, and games is increasing, providing unprecedented development opportunities for the dubbing industry. However, the dubbing industry is also facing many challenges as it rapidly expands. This article will analyze the current situation and problems of the dubbing industry in the era of intelligent media, draw on the successful experience of the Japanese voice actor industry, propose specific optimization strategies, explore the feasible development path of China's dubbing industry in the era of intelligent media, and promote its sustainable development.

**Keywords:** Business strategy; Intelligent media technology; Film and television dubbing art; Sustainable

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## 1. Introduction

In the era of intelligent media, due to the rise of the “ear economy”, the dubbing industry has moved from behind the scenes to the forefront, gradually becoming an important component of the cultural industry <sup>[1]</sup>. With the rapid development of intelligent media technology, the demand for high-quality dubbing in film and television dramas, animation, games, and other fields is increasing, providing unprecedented opportunities for the development of the dubbing industry. At the same time, the wide application of social media and the popularity of dubbing variety shows have brought dubbing actors into the public eye, accumulating a huge fan base and promoting the idolization and marketization of the industry <sup>[2]</sup>. However, as the industry rapidly expands, it also faces many challenges, such as imperfect talent training systems, inconsistent industry standards, and insufficient marketization. Therefore, this article will analyze the current situation and problems of the dubbing industry in the intelligent media era, draw on the successful experience of the Japanese voice actor industry, explore the feasible development path of China's dubbing industry in the intelligent media era, and promote its sustainable and healthy development.

## **2. Development status of the dubbing industry in the intelligent media era**

With the rapid development of intelligent media technology, the dubbing industry has encountered unprecedented growth opportunities in the intelligent media era.

### **2.1. Rapid growth in market demand**

Due to the advancement of intelligent media technology, the prosperity of cultural and entertainment industries such as film, television, animation, and gaming has driven the rapid expansion of the dubbing industry<sup>[3]</sup>. In recent years, with the significant increase in the production of domestic film and television dramas and animation works, the demand for dubbing has shown explosive growth. Especially with the explosive growth of IP adaptations and web dramas, the need for dubbing in film, television, and animation continues to expand. Additionally, the rapid development of the gaming industry has brought new business growth points to the dubbing industry. The widespread popularity of mobile and online games has made game dubbing an increasingly important segment in the industry, opening up vast development space for the dubbing industry.

### **2.2. Idolization of the dubbing industry and the rise of fan economy**

In the intelligent media era, dubbing actors are no longer just behind-the-scenes workers. They have gradually stepped into the spotlight through platforms such as variety shows and social media, becoming publicly recognized idols<sup>[4]</sup>. Many dubbing actors have gained a large number of fans through their outstanding dubbing works, and the trend of idolization in the dubbing industry is becoming increasingly evident. By participating in events like comic conventions, fan meetings, and live streams, dubbing actors not only expand their personal influence but also promote the development of the fan economy.

### **2.3. Diversification and popularization of the dubbing industry**

With the development of new media platforms, the dubbing industry is gradually showing diversification and popularization. Besides traditional film, television, and animation dubbing, emerging fields like radio plays and audiobooks are becoming the main work content for dubbing actors. Simultaneously, the technical threshold for the dubbing industry is gradually decreasing. The popularization of dubbing tools has enabled more people to easily participate in dubbing creation, promoting the widespread dissemination and popularity of the industry.

## **3. Challenges faced by the dubbing industry in the intelligent media era**

Despite the rapid development of the dubbing industry in the intelligent media era, it still faces a series of problems and challenges that restrict its further improvement and perfection.

### **3.1. Shortage of professional talent and imperfect training mechanisms**

The rapid expansion of the dubbing industry has intensified the demand for high-quality professional talent. However, the current domestic dubbing talent pool is far from meeting market requirements. Although some universities and vocational training institutions have offered relevant courses, the overall training system is still not perfect, especially for highly specialized dubbing actors, who are relatively scarce. Additionally, the lack of a systematic career advancement path and long-term training plan leads to high talent turnover within the industry, making it difficult to form a stable professional team.



### **3.2. Inconsistent industry standards and varying dubbing quality**

Currently, the dubbing industry has significant differences in standardization across different fields, lacking unified quality specifications. Although fields like film, television, animation, and gaming have certain requirements for dubbing, the lack of unified industry standards leads to significant fluctuations in dubbing quality. Furthermore, the internal qualification certification and evaluation mechanism for dubbing actors is not yet mature, resulting in varying dubbing quality. Consumers and audiences have inconsistent evaluations and expectations of dubbing works, further exacerbating the industry's irregularity.

### **3.3. Limited career development space and unreasonable income structure**

Despite the gradual idolization of the dubbing industry in recent years, where some well-known dubbing actors have gained widespread attention through variety shows and social media, the career development space for most dubbing practitioners remains limited. Compared to frontline actors, dubbing actors face a huge gap in professional influence and income. Additionally, the unreasonable income distribution mechanism and uneven resource distribution within the industry make dubbing actors face many difficulties in their career development.

## **4. Case study: Successful experience in the Japanese voice actor industry**

The Japanese voice actor industry enjoys a high reputation globally, owing its success to a comprehensive system and a highly market-oriented operational model. This provides valuable experience for the dubbing industry in other countries.

Firstly, the success of the Japanese voice actor industry is inseparable from its professional talent cultivation system. In Japan, the training and education of voice actors are systematic. Voice actor schools offer comprehensive courses covering professional content such as vocal techniques, character building, and voice performance <sup>[5]</sup>. Students have the opportunity to participate in actual dubbing projects during their school years. This “learning by doing” model helps them quickly adapt to the work environment after graduation.

Secondly, the market-oriented and idolized operational model of the Japanese voice actor industry is a crucial factor in its success. In Japan, voice actors are not just dubbing performers. They gradually develop into idol-level public figures by participating in diversified activities such as variety shows, record releases, and concerts <sup>[6]</sup>. Voice actor agencies play a significant role, responsible for the career management, training, and promotion of voice actors. Through comprehensive packaging and promotion, they transform voice actors into stars. Simultaneously, the highly market-oriented operation of the voice actor industry has enabled it to expand beyond dubbing for animations and films, extending into various fields like advertising, gaming, and audiobooks, forming a vast industrial chain.

The success of the Japanese voice actor industry also benefits from its comprehensive industrial chain support and the development of the fan economy. The influence of voice actors extends to adjacent industries. By participating in events like comic conventions, fan meetings, and radio dramas, voice actors establish close interactive relationships with fans, further enhancing the activity of the fan economy. The government also provides a favorable environment for the development of the voice actor industry through policy support and cultural promotion. Therefore, the Japanese voice actor industry has not only achieved tremendous success in the domestic market but has also become an integral part of the global cultural industry through the international dissemination of anime culture.

## **5. Development path of the dubbing industry in the intelligent media era**

The arrival of the intelligent media era has brought tremendous development opportunities to the dubbing industry, but it has also exposed issues such as talent shortages, insufficient marketization, and inconsistent industry standards. To promote the sustainable development of the dubbing industry, the industry can draw on the successful experience of the Japanese voice actor industry and explore suitable improvement paths for China from four aspects: talent cultivation, market-oriented operation, industrial chain construction, and fan economy<sup>[7]</sup>.

### **5.1. Building a professional talent cultivation system**

The talent shortage is currently one of the main challenges facing the dubbing industry. Many dubbing actors enter the industry through short-term training or self-study, lacking systematic professional education, which leads to varying dubbing levels within the industry. Drawing on the model of Japanese voice actor schools, domestic universities and vocational colleges should strengthen dubbing professional education and systematically cultivate dubbing talents<sup>[8]</sup>. Courses should cover skills such as voice performance, character building, and emotional expression. By collaborating with film, television, and animation companies, they can provide students with more practical opportunities and shorten the transition period for students to enter the market.

Furthermore, establishing a professional promotion and skill certification mechanism is crucial. The introduction of a tiered certification system through industry associations and continuous training for practitioners will encourage them to continuously improve their skills during their careers. This will help address the issue of inconsistent talent quality within the industry, provide a clear career development path for dubbing actors, and enhance the professional standards of the entire industry.

### **5.2. Promoting marketization and standardization simultaneously**

The marketization process of the domestic dubbing industry is not yet mature, and the lack of unified industry standards results in inconsistent dubbing quality across various fields, affecting the overall expressiveness of the works. To enhance the industry's competitiveness, it is essential to establish a sound standardization system while promoting market-oriented development. Industry associations should develop dubbing standards for different fields such as film, television, animation, and gaming, ensuring that the dubbing quality of various works meets professional requirements<sup>[9]</sup>. This will enhance audience trust in dubbing works and provide clearer work specifications for dubbing actors.

Simultaneously, marketization should be combined with the diversified development of the industry. Domestic dubbing actors can expand their personal influence by participating in activities such as variety shows, music, and advertising endorsements. Dubbing actors should not be confined to behind-the-scenes roles. Interacting with fans through social media, short video platforms, and other channels can increase exposure and enhance personal brand value. Dubbing studios and agencies should actively promote this comprehensive development model, helping dubbing actors expand their professional fields and enhance market dynamism.

### **5.3. Building a complete industrial chain and promoting cross-industry collaboration**

The development of the dubbing industry not only relies on talent and standards but also requires close integration with related industries. Currently, the collaboration between the domestic dubbing industry and industries such as film, television, animation, and gaming is relatively loose, making it difficult to form an efficient industrial chain. In contrast, the Japanese voice actor industry is highly integrated with related industries. Voice actors not

only participate in dubbing works but are also deeply involved in the promotion and development of peripheral products, extending their commercial value.

Therefore, the domestic dubbing industry should strengthen cooperation with film, television, animation, and gaming companies, ensuring that dubbing work receives adequate attention in every aspect of production. Dubbing studios can sign long-term cooperation agreements with relevant companies, establishing a long-term collaboration mechanism to ensure that dubbing quality perfectly aligns with the works from early planning to post-production. The government should promote the integration of the cultural industry chain through policy support, encourage the development of original dubbing works, and facilitate the domestic dubbing industry's connection with the international market through funding support and policy guidance, further enhancing the competitiveness of China's dubbing industry in the global cultural industry.

#### **5.4. Leveraging fan economy to expand diversified business models**

The fan economy is a crucial force driving the development of the dubbing industry. The Japanese voice actor industry has successfully attracted a large number of fans through an idol-based operational model, thereby driving the commercial operation of the dubbing industry. Similarly, China's dubbing industry can harness the fan economy to enhance its market influence. Social media and live-streaming platforms provide excellent channels for dubbing actors to interact with fans. Dubbing actors can showcase their dubbing skills through live streaming, short videos, and other means, interacting with fans and enhancing fan loyalty.

Meanwhile, offline events such as fan meetings and autograph sessions also help to expand the commercial influence of dubbing actors. Combined with the development of peripheral products, such as signed posters and souvenirs, dubbing actors can further maximize their commercial value through diversified business models.

### **6. Conclusion**

In the context of the intelligent media era, the dubbing industry has broad development prospects but still faces challenges such as talent shortage and insufficient marketization. By establishing a systematic talent cultivation system, promoting both marketization and standardization, building a complete industrial chain, and fully utilizing the fan economy, the dubbing industry can achieve long-term and healthy development<sup>[10]</sup>. Drawing on the successful experience of the Japanese voice actor industry, China's dubbing industry is expected to unleash greater potential in the future, becoming an indispensable force in the cultural industry.

### **Disclosure statement**

The author declares no conflict of interest.

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# A Critical Study on Multimodal Composing Competence of University Students from Hong Kong, Macao, and Taiwan Regions

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**Abstract:** This study investigates the digital multimodal composing competence of fifty freshmen from Hong Kong, Macao, and Taiwan regions in a Chinese University based on a systemic functional approach to multimodal discourse analysis (SF-MDA) and sociosemiotic ethnography. These students are divided into six groups and are required to make presentations on topics like sports, fashion, festivals, environment, and cities. The collected data include students' digital multimodal texts and interview responses. Findings show that a) students have the awareness of salience, but often misrepresent it; b) students are likely to confuse the relationship and function between the text and image as they often use the image with the least or redundant information to complement the text; c) students are likely to incorporate something irrelevant to the topic; d) students misuse the immersive image as a background due to lack of the concept of context; e) they usually provide excessive language information. This study also puts forward suggestions on the pedagogy of improving these students' multimodal literacies through optimizing the existing teaching method and setting up an instantaneous recall feedback form.

**Keywords:** Multimodal composing competence; Systemic functional approach to multimodal discourse analysis; Multimodality; Pedagogy; Students from Hong Kong, Macao, and Taiwan regions

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## 1. Introduction

Nowadays, there emerge an increasing amount of studies on multimodal composing, framed by multiliteracies and sociocultural theories, including exploring the affordances of linguistic and non-linguistic semiotic resources and analyzing the process of multimodal composing by individual or in collaboration, and improving multimodal pedagogy<sup>[1-14]</sup>. Many studies focused on the multimodal products and explored how language learners orchestrated



different kinds of modes into ensembles to fully express the intention and meaning, among which Shin et al. went further to explore why sixth-grade L2 learners orchestrate different modes in this way by adopting the method of a systemic functional approach to multimodal discourse analysis and principles of sociosemiotic ethnography<sup>[15–19]</sup>. However, few studies have summarized typical problems and general patterns of university students from Hong Kong, Macao, and Taiwan regions in orchestrating different modes before they receive any systematic multimodal knowledge. These students almost all live in a multilingual environment before receiving higher education in China's mainland. Some of them have lived in Hong Kong, Macao, and Taiwan regions since they were born and were accustomed to the education concept, teaching method, and evaluation system there.

To fill the research gap, this study examines the multimodal composing competence of fifty L2 freshmen from Hong Kong, Macao, and Taiwan regions in China by exploiting all available semiotic resources in multimodal PPT. These students have been divided into groups according to different topics. Each group is required to make a PowerPoint about the given topic and do a multimedia presentation in class. Researchers will critically analyze each group's PowerPoints by systemic functional approach to multimodal discourse analysis (SF-MDA) to test whether multimodal ensembles in each PPT slide and PPT slides as a whole have effectively expressed the ideational function, interpersonal function, and textual function or not. In particular, the intermodal relations between language and image will be analyzed. Besides, there will be a short interview after each presentation, concerned with the reasons for orchestrating multimodal resources in the way they did. Finally, the implications of pedagogy for developing students' multimodal composing competence will be discussed. This study specifically sought to answer the following questions by both quantitative and qualitative methods:

1. What are the typical problems of L2 freshmen from Hong Kong, Macao, and Taiwan regions in multimodal composing?
2. Why do they orchestrate different modes in this way?

## **2. Critical thinking of intermodal relations between language and image from the perspective of SF-MDA**

This study utilizes the systemic functional approach to multimodal discourse analysis (SF-MDA) to examine students' presentation slides. SF-MDA, grounded in social semiotics, leverages systemic functional linguistics (SFL) to analyze how various communication modes interact<sup>[20–21]</sup>. According to SFL, the metafunction of language includes ideational function, interpersonal function, and textual function<sup>[22–23]</sup>.

The ideational function is comprised of experiential and logical components. The experiential function conveys experiences from both external and internal realms, incorporating entities like people, objects, and events, typically represented through transitivity and voice. The interpersonal function reflects the speaker's identity, status, and attitudes, realized through mood, modality, and appraisal systems. Mood includes declarative, interrogative, and imperative structures, while modality addresses the speaker's judgments about propositions. The textual function organizes information through theme and rheme, where the theme conveys given information and the rheme provides new details<sup>[24]</sup>.

Unsworth identifies three intermodal relationships between language and images: concurrence, complementarity, and connection<sup>[25]</sup>. Concurrence occurs when language and images elaborate on the same information, presenting redundancy, exposition, instantiation, or homospatiality. Complementarity describes how images can add details that language may omit. Connection encompasses projection and conjunction. Projection

involves quoting and thought representation through intermodal links, while conjunction links time, place, and causation using symbols like arrows and circles. These relationships significantly enhance ideational meaning. Interpersonal meaning is conveyed through characters in images. According to Painter et al., images with a gaze engage viewers actively, while those without primarily convey information <sup>[26]</sup>. Textual meaning is reflected in layout, with familiar information typically on the left and unfamiliar on the right <sup>[27]</sup>.

The SF-MDA method proves useful in examining how students use various semiotic resources — linguistic, visual, aural, gestural, and spatial — to create meaning. This approach explores the grammar of these resources and their combinations <sup>[19, 28–29]</sup>. It has been applied to analyze pedagogic discourse and student compositions, highlighting the integration of language, gesture, and spatial arrangements in learning contexts <sup>[30–31]</sup>.

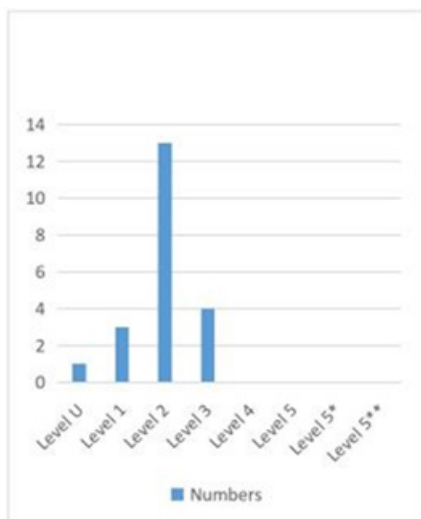
In this study, the researchers examine the combined effectiveness of language and images, positing that this synergy should be more diverse and impactful than the individual effects of either modality alone. Since redundancy between language and images does not enhance the overall information conveyed, it should not be encouraged in multimodal composition. The researchers will critically assess whether students select appropriate images that align with the language to effectively achieve ideational, interpersonal, and textual functions.

### 3. Research method

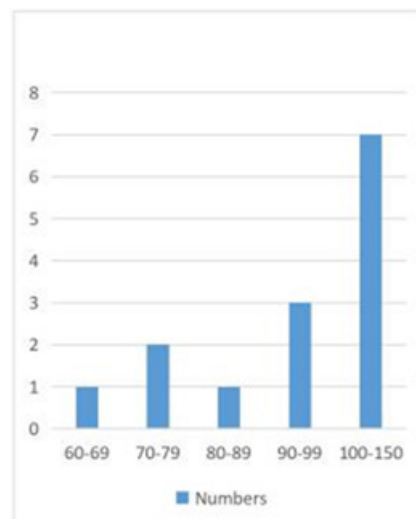
#### 3.1. Context and participant

This study examines 50 freshmen from Hong Kong, Macao, and Taiwan regions at a prestigious university that promotes a “facing overseas and facing Hong Kong, Macao, and Taiwan regions” policy. These students, raised in multilingual and multicultural environments, often display active thinking and distinct personalities. They gain admission through various ways, including DSE (Diploma of Secondary Education) in Hong Kong, Macao’s joint admission exam, national joint college entrance exam, and high school performance recommendations. DSE English scores range from fair (Level 3) to distinguished (Level 5\*\*), while Macao requires a passing score of 60 out of 100. In the Taiwan Region, the GSAT (General Scholastic Ability Test) identifies top performers at levels 11 and 12.

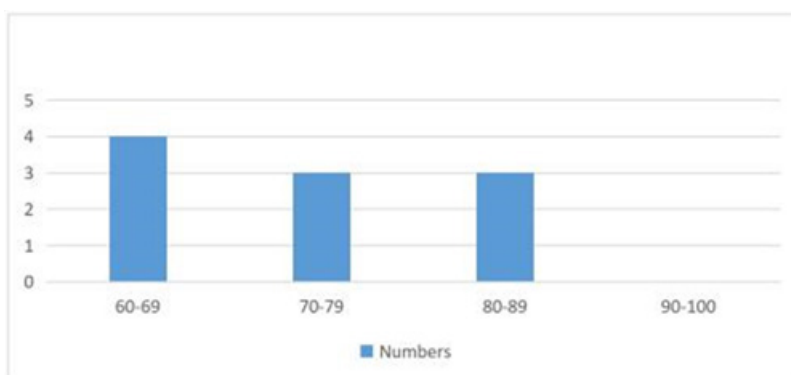
In this English class of fifty students, results show that only four out of thirteen students from Hong Kong achieved satisfactory DSE scores (**Figure 1**). Of the fourteen students who took the national joint college entrance exam, ten passed (**Figure 2**). In Macao, all recommended students qualified, but only three scored above 80 (**Figure 3**). Additionally, two students from the Taiwan region achieved level 11 on the GSAT, while three passed an upgraded recruitment exam. Overall, 58% of the students in this class passed their English examinations, with 36% attaining relatively high scores. They excel in listening and speaking skills but struggle with reading and writing. Furthermore, these students actively engage in English-related activities both inside and outside the classroom, displaying a greater willingness to express themselves compared to their peers from mainland China.



**Figure 1.** Number of English levels of students from Hong Kong in DSE



**Figure 2.** English score of students from Hong Kong, Macao, and Taiwan region in the joint college entrance examination



**Figure 3.** English scores of recommended students from Macao

### 3.2. Research methods

This study was based on four curricular units in the textbook of New Progressive College English Inspire 1 and New Progressive College English Inspire 2, including topics like sports, fashion, festivals, and environment, and was conducted by both quantitative and qualitative methods. Quantitatively, electronic copies of the PowerPoint slides around four topics were collected and analyzed by the methods of SF-MDA. Qualitatively, prompt interviews were done after each group's presentation. The researcher is their English teacher, and since she did not participate in the student's activity of making PowerPoint slides, nor did she give any suggestions, the interview in a certain sense, can be guaranteed as objective.

## 4. Findings

This study has summarized students' four major problems of failing to express metafunctions of language and text among 344 PPT slides, including misrepresentation of salience, misuse of immersive pictures, stylistic conflict, little correlation between pictures and texts, and excessive language information.

**Table 1** reveals that students generally manage the relationship between images and text well, with only 17.4% of PPT slides failing to express language and text metafunctions. The primary issue identified is “Little correlation between pictures and texts”, where students often select irrelevant images to match the text. Additionally, excessive English words or Chinese characters on slides increase reading difficulty, leading audiences to lose interest and overlook essential meanings. Problems of “Misrepresentation of salience” and “Misuse of immersive pictures” are nearly equally represented, as ineffective use of immersive images can downplay critical content. Mistakes related to “Stylistic conflict” are less frequent. It is important to note that multiple issues may occur within a single slide, resulting in a cumulative percentage that does not total 100%. A multimodal analysis expert independently coded the slides, and the comparison of results showed over 85% agreement with the author’s findings, ensuring the data’s accuracy and validity.

**Table 1.** Major problems of failing in expressing metafunctions of language and text

Reasons of failing to express metafunctions of language and text	Misrepresentation of Salience	Misuses of immersive pictures	Stylistic conflict	Little correlation between pictures and texts	Excessive language information
Numbers of PPT slides	11	10	4	23	12
Ratio	3.2%	3.0%	1.2%	6.7%	3.5%

#### 4.1. Misrepresentation of salience

According to Kress and van Leeuwen, in spatially integrated texts, salience is assessed through visual cues, such as size, sharpness of focus, tonal and color contrast, placement in the visual field, and perspective <sup>[32]</sup>.

In **Figure 4**, two images are analyzed, a smaller image depicting table tennis equipment and a larger image occupying nearly half the slide, featuring a triangle with trees, rocks, and table tennis items. Despite the larger size of the triangle, the table tennis elements, such as bats, balls, and a net, are minimized and blended with the green trees and gray rocks, making them less noticeable. One student from Group 2 was interviewed to explain the purpose and significance of the trees and rocks in the triangle, as well as the relationship between the rectangular and triangular images.

Researcher: What does this triangle stand for?

Student: It stands for the net, bat, and table tennis.

Researcher: What do you mean by using this triangle?

Student: We want to emphasize the net, table, bat, and ball as we believe that the three angles of the triangle can make them more striking.

Researcher: What’s the meaning of trees and rocks in the triangle?

Student: It is meaningless. It has no particular function except to be pleasing to the eyes. Researcher: Does the small picture have the same meaning as the big triangle?

Student: Yes.

Researcher: Why do you choose two pictures with the same meaning? Student: We just want to emphasize the table tennis.

Researcher: Since this topic is about “How to play table tennis”, why do you choose these pictures?

Student: Actually, we do not know how to choose the proper picture to illustrate the topic.

The interview reveals that students view the three sharp angles of a triangle as a means of emphasis. It seems plausible because the triangle as a symbol can really play the role of emphasis. However, in this case, the triangle is amplified as a picture with trees, rocks, a net, a bat, and table tennis. Thus, it loses the symbolic function of emphasis. Besides, the net, table, bats, and balls, which should be central, are overshadowed by the green trees and gray rocks. As Tversky et al. and Mayer note, multimedia elements must be relevant to the content to prevent cognitive overload<sup>[33–34]</sup>. Adding unrelated elements, like trees and rocks, compromises the educational value. Moreover, the student noted that the two pictures, both aiming to emphasize the net, table, bat, and ball, redundantly convey the same information. According to SF-MDA, these images, with little relevance to the topic of “How to play?”, fail to effectively convey conceptual meaning. Despite attempts to use the triangle for emphasis and attract attention, irrelevant content undermines both conceptual and interpersonal meaning.



**Figure 4.** Students' PowerPoint Text on ping pong

## 4.2. Misuses of immersive pictures

Immersive pictures serve as backgrounds in presentations, providing vivid visual scenes for text. It is a little difficult to use immersive pictures properly in the presentation. As the immersive picture takes up the whole slide, only concise text should be included.

Approximately three percent of immersive pictures in PowerPoint slides are used inappropriately, causing issues such as excessive text, repetitive use leading to aesthetic fatigue, and distraction from the main content when multiple images are present. **Figure 5** from a student presentation on industrial environmental pollution illustrates these problems. While the immersive picture effectively showcases industrial activities, it is overloaded with text, some of which interferes with the image, reducing readability.

Researcher: Why do you use immersive pictures in your presentation?

Student: The immersive picture can provide a vivid scene which can give audiences a visual impact.

Researcher: Why do you use the same immersive picture throughout the whole presentation?

Student: I think it has the same function as a PPT template, for they all can provide a background.

Interviews reveal that students understand the textual and interpersonal meanings of immersive pictures but often confuse them with PowerPoint templates. Templates can be reused without affecting readability as they carry minimal conceptual meaning. In contrast, immersive pictures convey specific meanings, requiring viewers to interpret the relationship between the image and text. Reusing the same immersive picture throughout a presentation hinders readability and leads to aesthetic fatigue. Moreover, a single immersive picture cannot



represent multiple distinct texts, as each relates to a different visual scene.

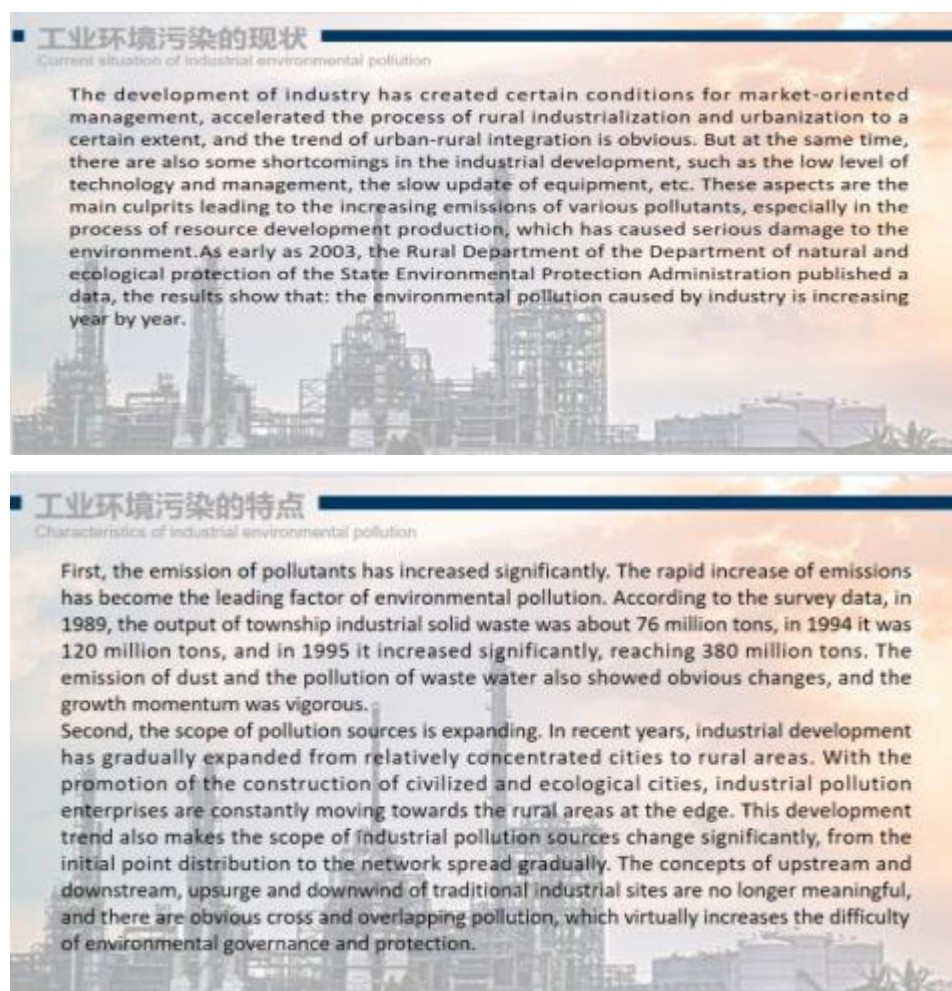


Figure 5. Students' PowerPoint texts on industrial environmental pollution

### 4.3. Stylistic conflict

Stylistic conflict refers to the presence of incompatible genres within the same context. In students' presentations, this specifically manifests as the coexistence of contrasting styles on a single PPT slide, such as the juxtaposition of a realistic image with a cartoon, or an incongruous combination of a classical template and modern content.

In **Figure 6**, an immersive image of a lively Mid-Autumn Festival celebration in a square is used as a backdrop, stylistic conflict arises when it is combined with a cartoon image, making the entire slide disjointed. This conflict can occur between images and text or among images themselves. An interview was conducted to explore whether students are aware of these stylistic issues.

Researcher: Have you ever noticed that the immersive picture was taken in the square?

Student: Yes.

Researcher: Why do you insert the cartoon in the immersive picture?

Student: Because we want to highlight the happy and harmonious atmosphere of the Mid-autumn festival with the cartoon.

Researcher: Can't the immersive picture fully convey such meaning?

Student: No. The immersive picture serves as a background and has been fuzzified. Therefore, we insert another picture to highlight the joyous atmosphere.

Researcher: Why do you insert a cartoon rather than a picture of the living scene in real life? Student: But it is more cute, isn't it?

The conversation reveals that students lack an understanding of genre, mistaking the immersive festival image, which features people celebrating with lanterns and humanoid doll lanterns, for a static cartoon. While the doll lanterns may resemble cartoon characters, the image itself portrays dynamic, real-life activities and should not be confused with a cartoon background. According to multimodal discourse analysis, consistency in image genre is crucial for creating a cohesive presentation<sup>[35]</sup>. Images that align in genre reinforce the message and enhance the narrative, making it easier for the audience to follow. Inconsistent image genres can cause confusion and distract from the main message<sup>[36]</sup>. Therefore, using images of the same genre as the dynamic, immersive picture is more effective than mixing genres. Consistent genre usage in slides ensures a coherent presentation and leaves a stronger impression on the audience.



Figure 6. Students' PowerPoint texts on Mid-autumn Festival

#### 4.4. Little correlation between pictures and texts

A weak correlation between images and text suggests a failure of images to elaborate, instantiate, complement, or connect meaningfully with the accompanying text. This disconnect is often due to a misunderstanding of the ideational, interpersonal, and textual meanings of the image.

In **Figure 7**, students presented water pollution using three distinct paragraphs. The first discusses water pollution as a challenge, the second emphasizes water's importance, and the third attributes pollution to industrialization. These paragraphs are not chronologically ordered, yet the accompanying image on the left illustrates a timeline from present to future with arrows and circles representing key events, which do not correspond to the text.

Researcher: Why do you use this picture in the slide? How do you understand this picture?

Student: We think this picture is very simple and clear. Considering that we are going to write an introduction to water pollution with many words, the three arrows in this picture may help the audience understand the meanings clearly as we have three corresponding paragraphs. Each arrow matches with one paragraph. Secondly, the big green circle with the word "NOW" is more than properly fitting our theme because we will talk about the present situation of water pollution.

Researcher: Have you ever thought about the logical meanings of arrows except the function of indexing?

Student: No.

An interview with Group 4's representative reveals a misunderstanding of the logical role of the arrows. Each arrow represents a distinct event on the timeline, which should reflect a progressive rather than parallel relationship. The green and blue arrows serve more than just as indices, as they appear on a dotted-line arrow. Additionally, since each paragraph is already color-coded, using arrows for differentiation is unnecessary.

From a systemic-functional multimodal discourse analysis (SF-MDA) perspective, the diagram does not support the text's conceptual meaning. The timeline in the image suggests events should be sequential, yet the text lacks a chronological structure, undermining the diagram's textual function. This misalignment between text and image results in a failure to effectively convey both ideational and textual meaning, compromising the overall coherence of the presentation.



Figure 7. Students' PowerPoint texts on water pollution

#### 4.5. Excessive language information

Given the limited space on PPT slides, it is important to provide a concise amount of text. Specifically, five or six lines in size 4 font are ideal. Excessive text may crowd out images, negatively impacting the text's effectiveness (Figure 8). Additionally, a high word count can quickly lead to reader fatigue, undermining the slide's interpersonal function. Once interest wanes, the overall conceptual meaning may be lost. An interview regarding motivation is presented below.



Figure 8. Students' PowerPoint texts on environmental pollution



Researcher: Have you noticed that there are excessive words in the PowerPoint Texts?

Student: Yes.

Researcher: Why do you put so many words on the slide?

Student: Because I am afraid that my English is poor and I cannot remember all the information. If I put them all on the slide, I would not feel anxious when I do the presentation.

Researcher: But it will increase the reading burden of readers and make them lose interest instantly.

Student: I know.

The conversation above illustrates that while students recognize the drawbacks of overcrowding slides with text, they prioritize their own sense of security during presentations. They fear the embarrassment of forgetting their words, making mistakes, and losing face in front of an audience. To address this, it is essential to provide students with more encouragement and support, helping them to rely less on text during their presentations and fostering their confidence.

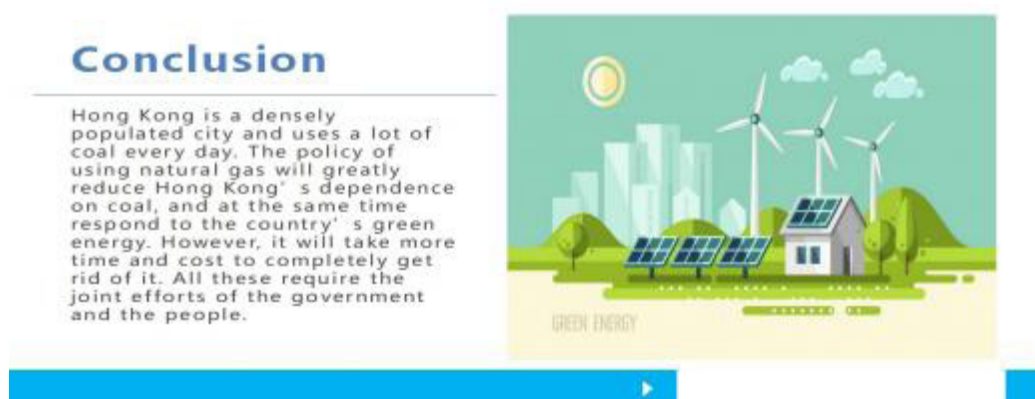
## 5. Pedagogical implications

Past research emphasized the challenge for teachers and the importance of supporting students' digital composing practices <sup>[13, 28, 37–38]</sup>. Unsworth and Mills proposed a practical pedagogy that incorporates non-linear planning, explicit grammatical design, and playful interaction <sup>[30]</sup>. Liang and Lim and Lim and Unsworth piloted a pedagogical framework that includes teaching metalanguage, guiding the design thinking process, introducing digital tools and methods, and providing structured lesson packages <sup>[14, 39]</sup>. These pedagogies generally follow a process-oriented approach rather than targeting specific issues, emphasizing the orchestration of language and video. However, the ability to integrate language and images effectively into texts is fundamental for creating compelling digital videos. Without strong multimodal orchestration skills, students struggle to produce quality content. Moreover, while Lim et al. and Lim et al. demonstrated that teaching metalanguage can enhance multimodal literacy, many students find it challenging to grasp these concepts without familiarity with the relevant terminologies <sup>[40–41]</sup>. Therefore, it is essential to optimize teaching methods to alleviate students' anxiety and frustration from the outset.

This paper aims to optimize teaching through representative examples. Educators can teach multimodality systematically by analyzing common mistakes in students' presentations. By comparing slides before and after modification, students can reflect on multimodal design and text organization. In each course, only one or two modes should be explicitly taught, and students must apply these concepts to specific contexts. For instance, **Figure 9** from Group 3's presentation on green energy illustrates a significant disconnect with the text which discusses the joint efforts needed from the government and citizens in Hong Kong to promote green energy. However, the image, a cold desktop computer display, fails to convey either ideational or interpersonal meaning. This PPT slide serves as an example for teaching the relationship between text and image by analyzing its shortcomings and proposing an alternative visual. Students can be guided to explore the differences in ideational, interpersonal, and textual meanings between the two images. **Figure 10** effectively represents a positive vision of green energy in Hong Kong, complementing the text appropriately.



**Figure 9.** Students' PowerPoint texts on city (Hong Kong) problems and solutions



**Figure 10.** Revised PowerPoint texts on city (Hong Kong) problems and solutions

After class, groups should exchange their PPT slides. Team members must read, select, and comment on slides that align with the multimodal knowledge, such as the appropriate use of immersive images and effective presentation of salient elements. They should return the slides to the original group with their feedback. If disagreements arise, teachers should encourage students to discuss these differences before addressing them in class. This approach not only provides effective training during lessons but also reinforces multimodal knowledge in students' independent work.

In addition to enhancing students' abilities to identify relationships between texts and images, it is essential to cultivate their assessment skills. Hafner and Ho advocated for diversified assessments of multimodal composing<sup>[42]</sup>. Previous studies have supported the idea that peer review serves as an effective formative assessment method for learning multimodal concepts<sup>[43–44]</sup>.

Recent studies have focused on assessing digital multimodal composing competence<sup>[45–48]</sup>. Various rating scales have been developed and refined, addressing linguistic, visual, gestural, auditory, and spatial modes as well as criteria related to context, substance, and organization<sup>[43, 45]</sup>. However, current assessment tools are primarily designed for video products. PPT presentations emphasize the relationship between text and images and the



speaker's language relative to slide content, whereas video assessments focus on factors such as facial expressions, actions, and cinematography. Thus, these criteria may not adequately evaluate multimodal literacy specific to PPT presentations.

The multimodal analysis of PPT slides is as crucial as analyzing digital video, particularly due to the nature of presentations. PPT slides synthesize complex information concisely, requiring effective organization and spatial deployment. Additionally, PPT slides are commonly used in academic and business contexts, making their effective design vital for communicative efficiency.

To effectively enhance students' multimodal literacy in PPT presentations, this paper proposes an instantaneous recall feedback form (**Table 2**) with two peer review questions: "What inspires or impresses you most in the other group's presentation?" and "What confuses you most regarding the text and image?" Students are required to answer these questions and provide justifications immediately after the presentation. This feedback mechanism assesses students' instantaneous comprehension and helps presenters recognize which modes were effectively utilized, which materials were selected, and which conceptual frameworks and language expressions effectively engaged their peers.

**Table 2.** Instantaneous recall feedback form

Questions	Answers	Reasons
What inspires or impresses you most in other group's presentations in terms of the text and picture?		
What confuses you most in other group's presentation in terms of the text and picture?		

## 6. Conclusion

Previous studies have discussed some major problems of PPT slides made by students, such as modality overload, misalignment with learning objectives, and poor visual design. Students often overload a single slide with excessive information and text, resulting in a monotonous reading experience instead of an engaging presentation<sup>[49–50]</sup>. Slides that deviate from the main topic or contain irrelevant information confuse the audience and diminish educational value<sup>[51]</sup>. Additionally, inadequate color use, inappropriate image selection, and lack of visual hierarchy make slides challenging to interpret<sup>[50]</sup>. This study confirms that students from Hong Kong, Taiwan, and Macao Regions at a Chinese university encounter similar issues when creating PPT slides, but also face new challenges, such as misrepresentation of salience, misuse of immersive images, and stylistic conflict. Moreover, previous studies primarily described these problems, rarely addressing their underlying causes. Understanding why students make such mistakes in PPT design is crucial for enhancing their multimodal composing skills.

This study examined the digital multimodal composing abilities of fifty freshmen from Hong Kong, Macao, and Taiwan regions using a systemic functional approach to multimodal discourse analysis (SF-MDA) and sociosemiotic ethnographic methods, before any formal multimodal instruction. Findings reveal five major issues affecting the expression of metafunctions in language and text: misrepresentation of salience, misuse of immersive images, stylistic conflict, poor correlation between images and text, and excessive language information. In today's digital era, multimodal composing is an essential literacy. Analyzing these students' abilities can not only help them express themselves more effectively on social media and excel in their future careers but also assist teachers in designing targeted and purposeful instruction grounded in systematic multimodal knowledge.

This study also offers pedagogical implications for enhancing students' multimodal literacy, including

optimizing teaching methods through case studies and implementing immediate feedback mechanisms. However, multimodal composing encompasses more than just the integration of semiotic resources such as language and images. It also involves the presentation and communication of language alongside other modes like sound, gesture, expression, and video. Further exploration is needed to understand how students create digital video productions and cohesively utilize linguistic and non-linguistic resources.

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## Disclosure statement

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# A Review of the Classification and Application of Workplace Humor

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**Abstract:** Given the prominent social and strategic positions that humor occupies in human society, especially within various organizations, a substantial number of entrepreneurs recognize its crucial role in the work environment. This research conducts a comprehensive exploration of the concept of humor. Firstly, it delves deeply into its origin. Subsequently, it provides a detailed elaboration of its definition. Next, it undertakes an in-depth analysis of its classification, categorizing humor into two types, namely positive humor and negative humor. Finally, it combs through the empirical research on the impact results of positive humor and negative humor. The ultimate aim is to provide theoretical support for the management of workplace humor, the facilitation of team collaboration, and the optimization of employee resource utilization.

**Keywords:** Humor; Positive humor; Negative humor; Team performance; Leadership humor; Self-deprecating humor

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## 1. Introduction

“Laugh and you’ll be ten years younger.” Humor, serving as a ubiquitous social behavior and strategic means within human society, assumes a significant role in organizational contexts <sup>[1]</sup>. A survey targeting entrepreneurs listed on the Fortune Global 500 reveals that over half of them acknowledge the crucial function of humorous expression in the workplace. Notwithstanding the extensive recognition and application of humor in work settings, its expression demands circumspect handling, as inappropriate humorous manifestations may precipitate unforeseen adverse consequences. The academic realm has reached a concordant view on this matter and, predicated on the pivotal positive and negative attributes of workplace humor, scientifically categorizes it into positive humorous expression and negative humorous expression. It exhibits diverse forms of manifestation, such as scenarios, narrative vignettes, puns, and anagrammatic wordplay. Among these, positive humorous expression pivots around affirmative interpersonal functions, which not only facilitates the development and sustenance of interpersonal relationships but also aids in fostering a positive self-awareness <sup>[2]</sup>. Conversely, negative humorous



expression is imbued with elements of teasing, sarcasm, and gloating, rife with hostility and provocation, and is frequently employed to ostracize, harm, or even dominate other members within the organization. Instances of such negative expression encompass attacks on individual physical idiosyncrasies (e.g., derogating physical impairments or eccentric apparel), gender-based assaults (e.g., vulgar jokes involving gender deprecation), and racial taunts (e.g., juxtaposing the imagery of dark individuals with that of primates). In summation, given the disparate natures of workplace humorous expressions, the multifarious and convoluted impacts they engender are both thought-provoking and meritorious of continuous scrutiny. In light of the aforementioned considerations, this project zeroes in on the nascent theme of humorous expression motivation, dissecting its connotation and structural underpinnings. Resolving these issues can furnish theoretical directives for the administration of workplace humor and also proffer a managerial foundation for mutual understanding and cooperation among team members, as well as the optimized utilization of employee resources.

## **2. The origin and definition of the concept of humor**

### **2.1. The origin of the concept of humor**

The connotation of the word “humor” has evolved several times in history, generally showing two major trends: one is the gradual evolution from physiological characteristics to behavioral traits; the other is the gradual transformation from a negative to a positive conceptual representation. The first to propose the concept of “humor” was Hippocrates, the “Father of Medicine” in ancient Greece around 400 BC. He believed that humor was a kind of body fluid beneficial to people’s physical health. Sigmund Freud, the founder of the psychoanalytic school, was the first to explain humor from the perspective of psychotherapy. He regarded humor as an internal defense mechanism for the human body to experience pleasure and incorporated humor and jokes into the system of psychotherapy.

The earliest appearance of the word “humor” in China was in the poem “Jiu Zhang Huai Sha” written by Qu Yuan during the Warring States period. However, the “humor” in this poem meant a quiet expression, not the commonly used meaning today. In 1923, Lin Yutang published a literary review on humor in the *Morning Post*. He translated the word “humor”, presenting an expression method that made people feel funny and pleasant. This was consistent with the way people in China expressed humor at that time, that is, by telling jokes and performing comical shows. Since then, domestic academic circles have conducted a lot of discussions and research on humor, and the effectiveness of humor in different situations still needs to be strengthened and deepened.

### **2.2. The definition of the concept of humor**

Currently, the definition of the concept of humor is mainly elaborated based on two levels: personality traits and interaction behaviors. Defining humor from the perspective of personality traits mainly refers to an individual’s sense of humor, which is manifested as a relaxed and witty psychological characteristic, such as the ability to generate, recognize, and use humor as a coping strategy. From the perspective of interaction behaviors, Martineau defined humor as “any form of communication and interaction with fun.” This kind of interaction includes both verbal and non-verbal forms and generates “positive emotional and cognitive feedback” among the audience.

In recent years, workplace humor has received increasing attention. Many scholars have also tried to define humor in the workplace. Cooper defined workplace humor as any interesting event shared by the humor sender with the humor receiver, and the humor receiver can also feel that this is a deliberate behavior of the humor

sender <sup>[3]</sup>. At the same time, he proposed a relational process model of humor in the workplace, stating that humor can create, maintain, hinder, or damage interpersonal relationships at work. Based on Cooper et al., Dijkers et al. proposed an organizational humor model based on the level of interactive communication, defining organizational humor as non-serious incongruous behaviors that occur in the work environment to deliberately amuse individuals, groups, or the organization. In recent years, scholars have continuously tried to define the concept of humor in the workplace context, and the specific content is shown in **Table 1**.

**Table 1.** Definition of the concept of humor

Author (Year)	Content of the concept definition
Crawford (1994)	Humorous expression is a communication process that can obtain a positive perception from the other party.
Cooper (2005)	Any event shared with others, aiming to make others laugh is regarded as an intentional behavior by others.
Cooper (2008)	Any interesting event shared by the humor sender with the humor receiver, and the humor receiver can also feel that this is a deliberate behavior of the humor sender.
Pundt & Herrmann (2015)	Humor is a strategy for leaders to adopt certain behaviors to achieve good social relationships.

### 3. The classification of the concept of humor

For the classification of the concept of humor, there are currently the following mainstream classification criteria:

Decker and Rotondo divided humor into positive humor and negative humor. Positive humor is mild, benign, and non-hostile. It refers to using humorous expressions, such as telling jokes and making kind-hearted jokes, to promote communication. Negative humor is expressed through telling dirty jokes and using insulting language for ridicule.

Martin et al. classified humor into self-enhancing humor, affiliative humor, aggressive humor, and self-defeating humor <sup>[4]</sup>. Self-enhancing humor means maintaining a positive attitude when facing negative situations and large stressors. Affiliative humor is positive and well-intentioned humor, such as sharing interesting jokes and stories. Aggressive humor is a negative form of humor, using making fun of others as a specific way to express humor. Self-defeating humor involves excessive self-depreciation and self-mockery to please others.

Gkorezis and Bellou, based on the classification of Martin et al., classified self-enhancing and affiliative humor as positive humor, and self-mocking and self-defeating humor as negative humor.

Zhu Yi divided humorous leadership into five types: self-enhancing, self-defeating, affiliative, aggressive, and self-mocking. Self-mocking humor means that leaders take their shortcomings and mistakes as the object of humor to narrow the relationship distance with employees.

Regardless of how scholars classify humor, it includes two key attributes: positive humor and negative humor. Positive humor is centered around positive interpersonal functions. It can not only promote the development and maintenance of interpersonal relationships but also help maintain a positive self-perception. Negative humor, on the other hand, is full of hostility and provocation. It is mainly used to exclude, harm, or even control other members of the organization to consolidate one's own position.

## 4. Empirical research results of humor

### 4.1. Impact results of positive humor

Positive humor is generally regarded as having positive impacts on both team and individual levels. At the team

level, firstly, in terms of team atmosphere, positive humor can enhance team cohesion. In addition, according to the Wheel Model of Humor proposed by Roberts and Wilbanks, leader humor can facilitate the formation of an organizational humorous atmosphere. Secondly, from the perspective of team performance, positive humor can boost team performance. For instance, Kangasharju and Nikko found that leaders' use of humor can create a favorable meeting atmosphere, introduce meeting topics in a relaxed manner, relieve employees' tension, help solve difficult problems, improve organizational performance, and achieve organizational goals. Lehman-Willenbrock and Allen, based on the context of company meetings, further proposed that the relationship between humor and team performance should be considered within the entire organizational social environment, and the importance of team communication needs to be emphasized.

At the individual level, firstly, in the aspect of work attitude, Decker examined employees' evaluations of leaders' humorous styles and found that positive leader humor can effectively promote employees' job satisfaction, enabling employees to be highly engaged in tasks and maintain a state of full concentration, thus enhancing employees' work engagement. Secondly, in the aspect of work behavior, the relaxed and pleasant working atmosphere created by leaders' positive humor is conducive to promoting the exchange and interaction of information within the organization, allowing employees to express their work ideas effectively and independently. Moreover, in the leader-follower relationship, according to the Relational Process Model of Leader Humor proposed by Cooper, leader humor helps to establish a positive relationship between leaders and followers<sup>[5]</sup>. By using positive humor, leaders can also enhance personal relationships with followers, which may contribute to the improvement of the quality of the leader-follower relationship<sup>[6-7]</sup>. Finally, in the aspect of work performance, Mesmer et al. found through meta-analysis that leaders' positive humor can significantly improve employees' work performance.

## **4.2. Impact results of negative humor**

Firstly, humor with aggressive and invasive characteristics from the leadership level would make it difficult for employees to extricate themselves from such situations, subjecting them to significant internal stress. Eventually, this may lead to addictive behaviors such as excessive Internet use, drinking, and smoking, as well as uncivilized behaviors. Yam et al. discovered that aggressive leadership humor exacerbates employees' acceptance of norm violations, thus resulting in deviant behaviors. Moreover, when leaders engage in negative humor, it may reduce followers' likability, further diminishing their willingness to seek advice from the leader, and aggravating followers' deviant behaviors<sup>[8]</sup>. Simultaneously, it may prompt followers to develop an avoidance tendency, thereby weakening their desire to voice themselves and reducing their commitment to the team<sup>[9]</sup>.

Negative humor also exerts negative impacts on teams and colleagues. For example, Gheorghe et al. demonstrated how different types of humor shape team conflicts and their transformation processes. In the supervisor-subordinate relationship, Hsiao et al. pointed out that aggressive leadership humor indirectly exacerbates workplace exclusion through supervisor rejection. In the context of colleague relationships, Zhang Mingyu et al., based on the new employee scenario, posited that the more severely new employees are subjected to aggressive humor from colleagues, the higher their level of self-depletion.

However, some scholars have also uncovered the potential positive effects of negative humor. For instance, Wang et al., based on the social information processing theory, argued that leaders' self-deprecating humor shortens the hierarchical distance, facilitating the formation of an intimate relationship between leaders and subordinates, demonstrating leaders' tolerance and honesty regarding their own failures. Furthermore, leaders' self-

deprecating humor can relax subordinates, reduce anxiety, and increase positive emotions, creating a non-hostile and inclusive atmosphere. When subordinates perceive leaders' self-deprecating humor, they are more likely to accept positive evaluations from the leader as signals of self-acceptance and self-affirmation. Therefore, they are more willing to learn from failures.

## 5. Retrospect and prospect

To sum up, humor is an emerging theme in the research fields of organizational behavior and human resource management. Through analyzing and sorting out relevant literature, this research field presents the following three characteristics.

Firstly, the attention paid to the impact results of humor is rather contradictory and one-sided. In existing studies, the main focus has been on the positive impacts of positive humor, such as triggering positive emotions and self-awareness and enhancing recipients' innovative behaviors and organizational citizenship behaviors. However, negative effects have also been discussed, such as increasing the acceptability of recipients' norm violations and inducing self-depletion of senders under the impression management motivation. Negative humor, although it may reduce recipients' psychological security and lead to uncivilized and exclusionary behaviors, existing studies have also found that negative humor can enhance leadership identification and promote subordinates' learning from failures. Such seemingly contradictory conclusions indicate that the research on workplace humor requires further exploration from a double-edged sword perspective to more comprehensively understand the role of humor in the workplace.

Secondly, previous studies have paid relatively little attention to the motivation of humorous expressions. Recently, some scholars have begun to focus on the impression management motivation of humor. However, existing literature provides only limited insights into the motivation of humorous expression, and the system is incomplete and unsystematic. Previous research perspectives have concentrated on attitudes, cognitions, and organizational factors. Nevertheless, the current research on the motivation of humor is rather scarce, and scholars have gradually realized that the more complex psychological mechanisms and motivations behind humor need to be further explored.

Thirdly, existing studies have focused on a single object of humor and have not incorporated both receivers and senders into a unified framework for discussion. In the current academic discussions, most studies have only focused on the single position of either the receiver or the sender of humor, failing to systematically examine the effect and mechanism of how the motivation affects subsequent attitudes and behaviors of positive and negative humor in the workplace. This one-sided research perspective limits the comprehensive understanding of the humor phenomenon. Researchers need to respond to the calls of scholars and expand and make up for the current deficiency in the research on the influence mechanism of workplace humor motivation.

## Disclosure statement

The author declares no conflict of interest.

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# The Relationship between Parenting Style and Social Behavior: A Systematic Review and Meta-analysis

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**Abstract:** Given that evidence for meta-analysis on the association between parenting style and social behavior has been relatively sparse, this research will provide useful information for the field. This article presents a meta-analysis of the association between parenting style and social behavior in Chinese children. A total of 47 eligible studies with 98 independent effect sizes (54,448 participants) were included in this meta-analysis. First, the study conducted a random-effects meta-analysis to assess the association between parenting style (positive vs. negative) and social behavior (prosocial vs. aggressive). Next, the study performed moderation analyses based on the meta-regression analyses for the continuous variable (sex ratio) and the  $Q$  statistics for categorical variables of the publication period (i.e., development period, COVID-19 period). Results were that positive parenting style was positively correlated with prosocial behavior ( $r = 0.24$ , 95%CI[0.17,0.31],  $P < 0.001$ ), whilst negative parenting style was negatively correlated with prosocial behavior ( $r = -0.10$ , 95%CI[-0.13,-0.06],  $P < 0.001$ ). Positive parenting style was negatively correlated with aggressive behavior ( $r = -0.17$ , 95%CI[-0.21,0.12],  $P < 0.001$ ), whilst negative parenting style was positively correlated with aggressive behavior ( $r = 0.23$ , 95%CI[0.15,0.30],  $P < 0.001$ ). These findings suggest that a positive parenting style should be applied as much as possible to shape children's prosocial behavior, whilst a negative parenting style should not be applied to avoid aggressive behavior.

**Keywords:** Parenting style; Social behavior; Systematic review; Meta-analysis

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## 1. Introduction

Prosocial behaviors refer to any behavior that is enacted with the intention to benefit another <sup>[1]</sup>. Aggressive behavior refers to any behavior that causes harm to others, including physical aggression, direct verbal aggression, and indirect aggression <sup>[2]</sup>. At present, research on children's aggressive behavior and prosocial behavior mainly

includes experiments, interviews, observations, psycho-metrics, and nominations. Prosocial behavior is a helpful behavior, while aggressive behavior is a harmful behavior <sup>[3-4]</sup>. Children's aggressive behavior is an important predictor of mental and behavioral health in adulthood <sup>[5]</sup>. Both prosocial and aggressive behaviors are prominent during the transition from late childhood to early adolescence <sup>[1]</sup>. Previous research has shown that the way prosocial and antisocial behaviors change throughout development depends on complex interactions between normative development, biological factors, social experiences, and situational ananets <sup>[1]</sup>. Parenting style plays an important role in children's behavioral development <sup>[6-7]</sup>. Thus, this study attempts to assess the association between parenting style, prosocial behavior, and aggressive behavior among young children.

Parenting style refers to parents' educational concepts, attitudes toward their children, and all their actions and words in the process of raising and educating their children <sup>[8]</sup>. It can be explained by the following three aspects of parenting type, behavioral practices, and comprehensive definitions <sup>[9]</sup>. In this study, parental styles are divided into positive parenting and negative parenting. Positive parenting refers to a warm and supportive emotion and behavior of parents towards children, including democracy, democratic authority, emotional warmth, and attention and help. Negative parenting refers to a kind of rejection, punishment, and hostile emotion and behavior of parents towards children, including capriciousness, autocratic, inconsistent, punishment orientation, denial, and over-protection. Based on this, parenting styles can be classified into positive and negative parenting styles.

### **1.1. Parenting style and social behavior**

Positive parenting positively predicts prosocial behavior in preschool children, such as democratic parenting positively predicts prosocial behavior <sup>[10-11]</sup>. However, authoritative parenting is positively connected with cooperative behavior in preschool children <sup>[12]</sup>. Specifically, children who receive warm and positive parenting are more likely to care for others than children who receive cold and rejecting parenting <sup>[13]</sup>. However, negative parenting is positively correlated with aggressive behavior <sup>[14-15]</sup>. Increases in negative parenting are significantly associated with children's conduct problems at follow-up <sup>[16]</sup>. Chinese parents as more controlling or authoritarian than their Western counterparts, but more detailed information regarding Chinese parenting styles and their contribution to children's aggression and prosociality is still needed <sup>[17]</sup>. In addition, parenting style is strongly correlated with prosocial behavior and aggressive behavior, suggesting the necessity of exploring the relationship between parenting style, prosocial behavior, and aggressive behavior <sup>[18-19]</sup>.

### **1.2. Sex and publication period as potential moderators**

First, sex is a potential moderator. For example, boys are more likely to demonstrate aggressive behaviors than girls in terms of authoritarian parenting style <sup>[20]</sup>. In addition, boys generally show less prosocial behaviors than girls in terms of authoritarian parenting style <sup>[21]</sup>. Therefore, sex may function as a potential moderator in the association between parenting style, prosocial behavior, and aggressive behavior. Second, the publication period may be a potential moderator. The publication period can be divided into the COVID-19 period (December 2019 to December 2022) and the development period. Since COVID-19 was included in the Class B infectious diseases and managed as Class A, the Chinese government has adopted a home-based isolation approach to ensure the health of the general public <sup>[22]</sup>. About 220 million children and adolescents in China have been quarantined at home, the prevalence of emotional disorders among adolescents generally increased after the epidemic peak, and the scores of behavioral problems among children of all ages increased during the epidemic isolation period <sup>[23-24]</sup>. Negative parental practices were positively associated with emotional/behavioral problems in children during the

pandemic <sup>[25]</sup>. Therefore, the publication period may moderate the association between parenting style, prosocial behavior, and aggressive behavior.

### 1.3. The present study

A previous meta-analysis of the association between parenting styles and aggressive behavior in adolescents was conducted, but the samples were from Western cultures <sup>[26]</sup>. In addition, some meta-analyses examined parenting styles and prosocial behavior, without Chinese preschool children being involved <sup>[27–28]</sup>. In light of this, this study applied a meta-analysis to investigate the association between parenting styles (positive versus negative) and prosocial behavior and aggressive behavior among preschool children.

## 2. Method

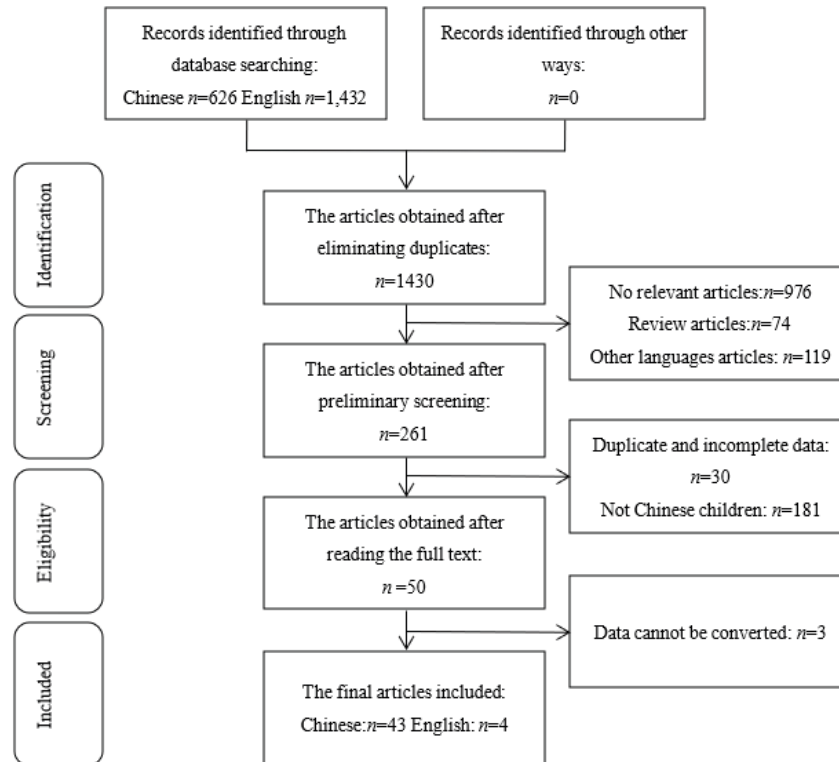
### 2.1. Inclusion criteria

Studies were screened based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines <sup>[29]</sup>. To be included in the meta-analyses, (a) the study had to evaluate an aspect of parenting style in relation to prosocial behavior and aggressive behavior, either as general forms or specific types. (b) the study must be published in English or Chinese. (c) child participants from 0 to 7 years old include normal children and abnormal children. (d) the association between parenting style, prosocial behavior, and aggressive behavior must be reported in correlation coefficients (R-values) or other statistics converted to correlation coefficients (f-values, T-values,  $\chi^2$  values, etc.).

### 2.2. Search strategy

The study used the three-step method to search for studies. First, the study searched the empirical studies on the association between parenting styles, prosocial behavior, and aggressive behavior in preschool children from the following databases: China National Knowledge Infrastructure (CNKI), Chinese Wanfang Database, China Science and Technology Journal Database, Web of Science, ERIC, Proquest, and PsycInfo. The searched keywords were as follows: [parenting style OR parenting OR parenting behavior OR parenting rearing OR parenting practices OR family style OR mother parenting OR father parenting] AND [prosocial behavior OR cooperate OR comfort OR altruist OR morale OR aggressive behavior OR problem behavior OR violence OR bullying behavior OR peer bullying]. Two filters were applied such that the search was limited to Chinese children (birth–7 years old) and in English or Chinese. Second, studies were searched by screening reference lists of studies and review articles found in the first step of this search procedure [27, 30]. Finally, the study attempted to obtain unpublished research papers through personal contact with the authors.

After the initial articles search and elimination of duplicates, a total of 1,430 articles were obtained. After reviewing all the titles and abstracts and excluding apparently irrelevant studies, a total of 261 articles were deemed suitable for further examination. After thoroughly assessing these articles, a total of 47 articles using 98 independent samples met the inclusion criteria and were therefore included in the present review. **Table 1** shows the overview of the included studies and their characteristics. **Figure 1** shows the flow chart of the search procedure.



**Figure 1.** PRISMA flow of Literature inclusion process

## 2.3. Coding procedures

The included articles were coded as follows: 1 = first author, 2 = year, 3 = sample size, 4 = female, 5 = sample source, 6 = parenting style research tools, and 7 = social behavior research tools.

**Table 1** shows the characteristics of the eligible studies, all coded independently. Two coders encode all the information according to a coding manual, which specifies the types of coding used and possible codes for each study. The two coders reached 96% agreement on the code, and all differences were resolved by consensus.

In the process of coding, the following principles are followed: (1) The generation of effect values is based on independent samples, and each independent sample is encoded only once. If a paper reports multiple independent samples at the same time, the corresponding coding should be conducted several times; (2) If the characteristics of the subjects are correlated, they will be coded separately; (3) If the study is a longitudinal study, each measurement result is coded separately; (4) If the effect values of total parenting style, total aggressive behavior and total prosocial behavior were not reported in the study, but the effect values of each subscale were reported separately, the average value was taken as the initial effect value.

**Table 1.** Characteristics of the 47 studies included in the meta-analysis

Number	First author	Year	Sample size	Female (%)	Sample source	Parenting style measure	Social behavior measure
1	Bai <sup>[31]</sup>	2019	88	0.4	Ji Lin	PSQ (Yang, 1998)	CBCL (Achenbach, 1991)
2	Bi <sup>[32]</sup>	2010	260	0.51	Tianjin	PSQ (NA)	CBE (self-made)
3	Chen <sup>[33]</sup>	2012	275	NA	Chongqing	PSQ (Gong, 2005)	SDSC4-7 (Chen, 1998)
4	Deng <sup>[34]</sup>	2013	427	0.49	Jiangsu	PSQ (self-made)	PBQ (self-made)

**Table 1 (Continued)**

Number	First author	Year	Sample size	Female (%)	Sample source	Parenting style measure	Social behavior measure
5	Deng <sup>[35]</sup>	2020	3167	0.45	Hubei	PBI (Lovejoy, 1999)	SDQ (Goodman, 1997)
6	Ding <sup>[36]</sup>	2020	340	0.47	Sichuan	PSQ (Yang, 1998)	PBQ (Deng, 2013)
7	Du <sup>[37]</sup>	1999	504	NA	Shanxi	PSQ (self-made)	CBCL (Achenbach, 1991)
8	Fei <sup>[38]</sup>	2020	291	0.53	Hunan	PSQ (Yang, 1998)	CBCL (Achenbach, 1991)
9	Gao <sup>[39]</sup>	2021	382	0.49	Hubei	PSDQ (Robinson, 2001)	HBE and SBE (self-made)
10	Han <sup>[40]</sup>	2020	387	0.48	Liaoning	PSQ (Yang, 1998)	PCGQ (self-made)
11	Hu <sup>[10]</sup>	2022	188	0.46	Hubei	PSQ (Yang, 1998))	PBQ (Deng, 2013)
12	Huang <sup>[41]</sup>	2020	394	0.51	Hunan	PSQ (Yang, 1998)	SDSC4-7 (Chen, 1998)
13	Jia <sup>[15]</sup>	2014	1164	0.45	Shanghai	PBI (Lovejoy, 1999)	ABQ (Dodge, 1987)
14	Jia <sup>[17]</sup>	2016	1382	0.44	Shanghai	PBI (Lovejoy, 1999)	CBCL (Achenbach, 1991)
15	Xie <sup>[18]</sup>	2015	353	0.43	Liaoning	PSQ (Yang, 1998)	CBCL (Achenbach, 1991)
16	Li <sup>[42]</sup>	2019	590	0.53	Sichuan	EMBU (Perris, 1980)	CBCL (Achenbach, 1991)
17	Li <sup>[43]</sup>	2018	105	0.65	Guangdong	PSDQ (Robinson, 2001)	SDSC3-9 (Chen, 1994)
18	Li <sup>[44]</sup>	2021	310	0.5	Shandong	PSQ (Liu, 2014)	CCBQ (Goyette, 1978)
19	Li <sup>[45]</sup>	2021	120	0.54	Chongqing	PARQ (Rohner, 2005)	SDQ (Goodman, 1997)
20	Li <sup>[46]</sup>	2018	231	NA	Xinjiang	PSQ (Yang, 1998)	CBCL (Achenbach, 1991)
21	Long <sup>[47]</sup>	2018	635	0.48	Shandong	MPSQ (Chen, 2004)	PCBQ (Yang, 2008)
22	Luo <sup>[48]</sup>	2022	757	NA	Chongqing	PSDQ (Robinson, 2001)	SDQ (Goodman, 1997)
23	Luo <sup>[49]</sup>	2021	814	0.46	Chongqing	PSDQ (Robinson, 2001)	PCGHQ (Luo, 2017)
24	Ma <sup>[50]</sup>	2022	2201	0.47	Anhui	PBI (Lovejoy, 1999)	SDQ (Goodman, 1997)
25	Ma <sup>[51]</sup>	2023	557	0.46	Guizhou	PBI (Lovejoy, 1999)	SDQ (Goodman, 1997)
26	Ma <sup>[52]</sup>	2021	301	0.3	Chongqing	PAQ (Reitman, 2002)	PBQ (Deng, 2013)
27	Narin <sup>[53]</sup>	2012	637	NA	Inner Mongolia	PSQ (Yang, 1998)	SDSC4-7 (Chen, 1998)
28	Nelson <sup>[54]</sup>	2006	215	0.53	Beijing	PSDQ (Robinson, 2001)	CAPN (Crick, 1997)
29	Niu <sup>[55]</sup>	2016	125	0.44	Shaanxi	PSQ (Yang, 1998)	SBE (self-made)
30	Song <sup>[56]</sup>	2020	365	0.47	Shaanxi	PSQ (Yang, 1998)	PBQ (Deng, 2013)
31	Sun <sup>[57]</sup>	2022	197	NA	Shanghai	MWE (Hane, 2008)	SCBS (Liu, 2012)
32	Wang <sup>[58]</sup>	2017	329	NA	Ji Lin	PSQ (Yang, 1998)	PBQ (Deng, 2013)
33	Wang <sup>[59]</sup>	2015	476	0.48	Jiangsu	PSDQ (Robinson, 2001)	WCBS (NA)
34	Xiang <sup>[60]</sup>	2016	477	0.49	Jiangsu	PSDQ (Robinson, 2001)	CSQ (NA)
35	Xing <sup>[61]</sup>	2017	167	0.46	Shandong	PARQ (Rohner, 2005)	SDQ (Goodman, 1997)
36	Yan <sup>[62]</sup>	2007	120	0.31	Inner Mongolia	MPSQ (self-made)	SOBB (self-made)
37	Yang <sup>[63]</sup>	2017	86	0.44	Sichuan	PSQ (Yang, 1998)	ABOT (Denson, 2012)
38	Yi <sup>[64]</sup>	2021	80	0.5	Chongqing	PSQ (Yang, 1998)	CBCL (Achenbach, 1991)
39	You <sup>[65]</sup>	2020	208	0.41	Henan	PSDQ (Robinson, 2001)	CBCL (Achenbach, 1991)



**Table 1 (Continued)**

Number	First author	Year	Sample size	Female (%)	Sample source	Parenting style measure	Social behavior measure
40	Yu <sup>[19]</sup>	2016	478	0.45	Liaoning	PSQ (Yang , 1998)	PBQ (Cheng, 2006)
41	Zhang <sup>[66]</sup>	2019	465	0.45	Shandong	PSQ (Yang, 1998)	CBCL (Achenbach, 1991)
42	Zhang <sup>[67]</sup>	2016	66	0.5	Shandong	PSQ (Block, 1998)	MBE (self-made)
43	Zhang <sup>[68]</sup>	2021	273	0.54	Sichuan	PSQ (Parker, 1979)	ABQ (NA)
44	Zheng <sup>[69]</sup>	2013	231	0.47	Xinjiang	MPSQ (Chen, NA)	SDSC3-9 (Chen, 1994)
45	Zhou <sup>[70]</sup>	2012	352	NA	Yunnan	PSQ (Maccoby, NA)	CBPQ (self-made)
46	Zhu <sup>[71]</sup>	2020	214	0.5	Zhejiang	PSQ (Yang, 1998)	SDSC4-7 (Chen, 1998)
47	Zong <sup>[72]</sup>	2005	66	0.54	Shanghai	PSQCC (NA)	HBE and SBE (self-made)

Note: Behavior Questionnaire, SDSC4-7=Social Development Scale for children aged 4–7 years, SDSC3-9=Social Development Scale for children aged 3–9 years, CAPN=Child aggressive peer nomination, CBE=Cooperative Behavior Experiment, HBE=Help Behavior Experiment, SBE=Share Behavior Experiment, MBE=Moral Behavior Experiment, PCGQ=Preschool Children gratitude questionnaire, ABQ=Aggressive Behavior Questionnaire, CCBQ=Conners Child Behavior Questionnaire, PCBQ=Preschool Children Bullying Questionnaire, PCGHQ=Preschool Children Good Habits Questionnaire, SCBS=Social Competence and Behavior scale, WCBS=Worrying Child Behavior Scale, CSQ=Children Social Questionnaire, SOBB=Situational Observation Of Bullying Behavior, ABOT=Attack Behavior Observation Table, CBPQ=Child Behavioral Problems Questionnaire.

## 2.4. Statistical analysis

CMA (Comprehensive Meta-Analysis) 3.0 was used for statistical analysis with statistical significance set at  $P < 0.05$ . First, the heterogeneity among effect values was investigated by using the heterogeneity Q test and the  $I^2$  test, based on which the analysis model was selected.  $I^2 > 50\%$  or  $P < 0.05$  indicated statistically significant heterogeneity, in the absence of significant heterogeneity, the fixed-effects model was used to estimate the effect size and their 95% CI. If there was obvious heterogeneity, a random-effect model was selected. Subgroup analyses were used to explore potential sources of heterogeneity. Publication bias was assessed using funnel-plot analysis and Egger's tests. Note that only independent effect values of 4 or more subgroups were included in the subgroup analysis <sup>[73]</sup>.

To evaluate the association between parenting style and social behavior, the Pearson correlation coefficient  $r$  is the effect value index. If  $r$  values are not reported in the literature,  $t/d/\beta/\eta^2/OR$  values reported in the literature are used for conversion. The conversion formula is as follows <sup>[74]</sup>:  $r = \beta * 0.98 + 0.05\lambda$  (when  $-0.5 < \beta < 0$ ,  $\lambda = -1$ ; When  $0 < \beta < 0.5$ ,  $\lambda = 1$ );  $d = \ln(OR)$ .

## 2.5. Quality assessment

Five factors quality criterion was used to evaluate the quality of the studies included <sup>[75]</sup>. Subject selection, effective rate, reliability, and publication level all are designated as three levels: 2 points, 1 point, or 0 points. The total score is the articles quality score, which ranges from 0 to 8. The higher the score, the higher the quality of the articles. **Table 2** shows specific scores.

**Table 2.** Results of quality assessment

Number	Included literature	Subject selection	Effective rate	Reliability	Publication level	Score
1	Bai, 2019	1	1	1.5	1	4.5
2	Bi, 2010	2	0	1.5	1	4.5
3	Chen, 2012	1	2	2	1	6
4	Deng, 2013	1	0	2	1	4
5	Deng, 2020	2	2	1	1	6
6	Ding, 2020	1	2	1.5	1	5.5
7	Du, 1999	1	0	2	0	3
8	Fei, 2020	2	2	2	1	7
9	Gao, 2021	1	1	2	1	5
10	Han, 2020	1	1	1.5	1	4.5
11	Hu, 2022	1	1	1.5	1	4.5
12	Huang, 2020	2	2	2	1	7
13	Jia, 2014	1	1	2	2	6
14	Jia, 2016	2	1	2	1	6
15	Jie, 2015	2	2	1.5	1	6.5
16	Li, 2019	2	1	2	1	6
17	Li, 2018	1	1	2	0	4
18	Li, 2021	1	2	2	2	7
19	Li, 2021	1	2	1.5	1	5.5
20	Li, 2018	2	2	1.5	1	7.5
21	Long, 2018	2	0	1.5	1	4.5
22	Luo, 2021	1	2	2	2	7
23	Luo, 2022	2	2	1	0	4
24	Ma, 2022	2	2	2	2	8
25	Ma, 2023	1	2	1	0	4
26	Ma, 2021	1	1	1	1	4
27	Narin, 2012	2	1	1.5	1	6.5
28	Nelson, 2006	1	1	1.5	2	5.5
29	Niu, 2016	2	0	1.5	1	4.5
30	Song, 2020	2	0	1.5	1	4.5
31	Sun, 2022	2	0	2	2	6
32	Wang, 2017	1	2	1.5	1	5.5
33	Wang, 2015	1	1	1	1	4
34	Xiang, 2016	2	1	1	1	5
35	Xing, 2017	2	0	1.5	1	4.5
36	Yan, 2007	2	0	1	1	4

**Table 2 (Continued)**

Number	Included literature	Subject selection	Effective rate	Reliability	Publication level	Score
37	Yang, 2017	1	0	1.5	1	4.5
38	Yi, 2021	1	1	2	0	4
39	You, 2020	1	1	1	1	4
40	Yu, 2016	1	2	0.5	1	4.5
41	Zhang, 2019	2	2	1.5	1	6.5
42	Zhang, 2016	2	0	2	1	5
43	Zhang, 2021	2	0	1	1	4
44	Zheng, 2013	2	0	2	0	4
45	Zhou, 2012	1	1	1	1	4
46	Zhu, 2020	1	1	2	1	6
47	Zong, 2005	1	0	1	2	4

### 3. Results

#### 3.1. Sample

The sample was derived from 47 eligible studies (54,448 participants) with 98 independent effect sizes (positive parenting style and prosocial behavior 29 effect sizes, negative parenting style and prosocial behavior 27 effect sizes, positive parenting style and aggressive behavior 21 effect sizes, negative parenting style and aggressive behavior 21 effect sizes) on the association between parenting style and social behavior of preschool children.

#### 3.2. Effect sizes and heterogeneity test

Heterogeneity Q test and  $I^2$  test were performed for effect values. There were significant differences among the effect values ( $Q = 536.155, P < 0.001$ ;  $Q = 108.230, P < 0.001$ ;  $Q = 130.532, P < 0.001$ ;  $Q = 438.049, P < 0.001$ ). The  $I^2$  values were 94.778%, 75.935%, 84.678%, and 95.434%, respectively. The cut-off points of  $I^2$  values were 25%, 50%, and 70%, representing low, medium, and high heterogeneity respectively<sup>[76]</sup>. Therefore, there was significant high heterogeneity among effect values in this study, indicating that the variation between effect values may be affected by potential moderating variables. In this study, there are real differences in effect values under different adjustment variables, so the random effects model is intended to be used for testing the main effect.

**Table 3** showed that positive parenting style was positively correlated with prosocial behavior ( $r = 0.24, P < 0.001$ ); negative parenting style was negatively correlated with prosocial behavior ( $r = -0.10, P < 0.001$ ); positive parenting style was negatively correlated with aggressive behavior ( $r = -0.17, P < 0.001$ ); negative parenting style was positively correlated with aggressive behavior ( $r = 0.22, P < 0.001$ ).

A study systematically and quantitatively analyzed the correlation sizes obtained from 708 meta-analyses in individual difference correlation studies and suggested that  $r = 0.1$ ,  $r = 0.2$ , and  $r = 0.3$  be considered as low, medium, and strong correlations, respectively<sup>[77]</sup>. According to this criterion, positive parenting style had a medium correlation with prosocial behavior; negative parenting style had a low correlation with prosocial behavior; positive parenting style had a low correlation with aggressive behavior; negative parenting style had a medium correlation with aggressive behavior.

**Table 3.** The main effect of parenting style on social behavior

Variables	Model	K	N	Effect value and 95%CI			Two-tail	
				r	LL	UL	Z	P
Positive parenting on prosocial behavior	Random	29	14197	0.249	0.176	0.319	6.528	0.000
Negative parenting on prosocial behavior	Random	27	13433	-0.100	-0.138	-0.061	-5.084	0.000
Positive parenting on aggressive behavior	Random	21	12858	-0.170	-0.218	-0.122	-6.855	0.000
Negative parenting on aggressive behavior	Random	21	13960	0.234	0.158	0.306	5.946	0.000

### 3.3. Moderation analysis

The current meta-analysis examined child sex (female), and publication period (COVID-19 and non-COVID-19 period).

**Table 4** showed that sex could not significantly moderate the positive parenting style and prosocial behavior ( $P = 0.956$ ), negative parenting style and prosocial behavior ( $P = 0.634$ ), positive parenting style and aggressive behavior ( $P = 0.843$ ), negative parenting style and aggressive behavior of preschool children ( $P = 0.116$ ).

**Table 5** shows the following results. The publication period ( $P = 0.095$ ) could not significantly moderate the association between positive parenting style and prosocial behavior. The publication period ( $P < 0.05$ ) could significantly moderate the association between negative parenting style and prosocial behavior, specifically, the effect value of the COVID-19 period ( $r = -0.14$ ) was stronger than the development period ( $r = -0.03$ ). The publication period ( $P = 0.090$ ) could not significantly moderate the association between positive parenting styles and aggressive behavior. The publication period ( $P = 0.338$ ) could not significantly moderate the association between negative parenting styles and aggressive behavior.

**Table 4.** Meta-regressive moderating effect of parenting style on social behavior

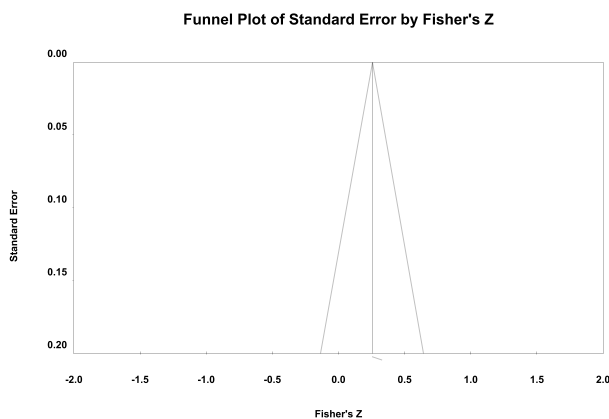
Moderators	Variables	$\beta$	SE	95%CI		P
				LL	UL	
Female (%)	Positive parenting on prosocial behavior	-0.038	0.71	-1.43	1.353	0.956
	Negative parenting on prosocial behavior	-0.182	0.383	-0.934	0.569	0.634
	Positive parenting on aggressive behavior	0.115	0.584	-1.029	1.261	0.843
	Negative parenting on aggressive behavior	-1.277	0.813	-2.87	0.316	0.116

**Table 5.** Subgroup moderating effect of parenting style on social behavior

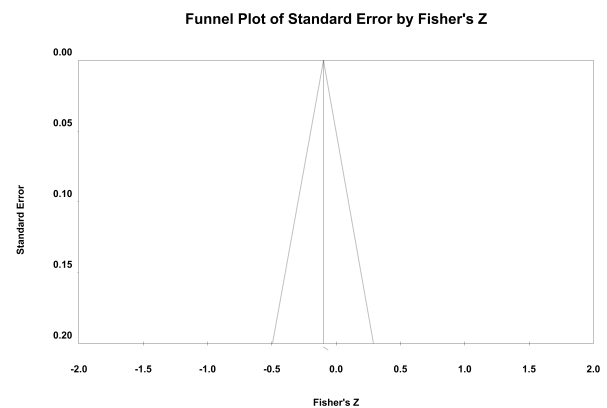
Variables	Heterogeneity test			Types	K	N	95%CI			Two-tail	
	Q	df	P				r	LL	UL	Z	P
positive parenting style on prosocial behavior	2.784	1	0.095	COVID-19 period	15	9666	0.308	0.238	0.376	8.162	0
				Non-COVID period	14	4531	0.175	0.028	0.314	2.322	0.02
negative parenting style on prosocial behavior	5.752	1	0.016	COVID-19 period	13	8902	-0.145	-0.189	-0.1	-6.271	0
				Non-COVID period	14	4531	-0.05	-0.113	0.014	-1.518	0.129
positive parenting style on aggressive behavior	2.871	1	0.09	COVID-19 period	9	7484	-0.214	-0.262	-0.164	-8.352	0
				Non-COVID period	12	5374	-0.138	-0.21	-0.064	-3.627	0
negative parenting style on aggressive behavior	0.919	1	0.338	COVID-19 period	7	7207	0.278	0.213	0.341	8.044	0
				Non-COVID period	14	6753	0.214	0.095	0.326	3.487	0

### 3.4. Publication bias

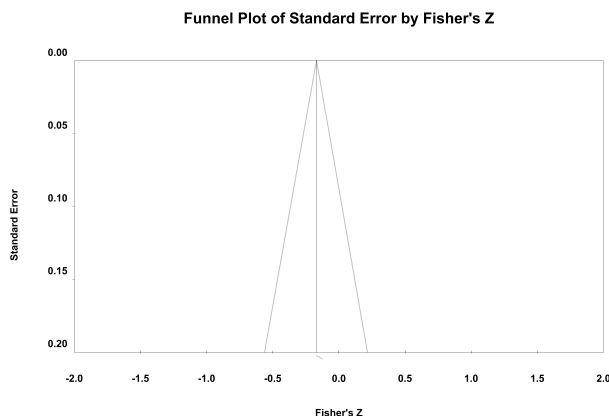
First, funnel plots were used to examine the publication bias of this study. The funnel plots (**Figures 2–5**) showed that the effect values of positive parenting style and prosocial behavior, negative parenting style and prosocial behavior, positive parenting style and aggressive behavior, and negative parenting style and aggressive behavior were basically distributed on both sides of their total effect size. The results showed that Egger's linear regression result of positive parenting style and prosocial behavior, negative parenting style and prosocial behavior, positive parenting style and aggressive behavior, negative parenting style and aggressive behavior was not significant <sup>[78]</sup>. The result of Egger's test showed no significant intercept value of correlation between positive parenting style and prosocial behavior (The intercept = -0.39, 95%CI: [-4.10, 3.31]), indicating no publication bias [ $t(25) = 1.19$ ,  $P = 0.82$ ]. The result of Egger's test showed no significant intercept value of correlation between negative parenting style and prosocial behavior (The intercept = -0.99, 95%CI: [-2.69, 0.71]), indicating no publication bias [ $t(25) = 1.19$ ,  $p = 0.24$ ]. The result of Egger's test showed no significant intercept value of correlation between positive parenting style and aggressive behavior (The intercept = 0.87, 95%CI: [-1.57, 3.32]), indicating no publication bias [ $t(25) = 1.19$ ,  $P = 0.46$ ]. The result of Egger's test showed no significant intercept value of correlation between



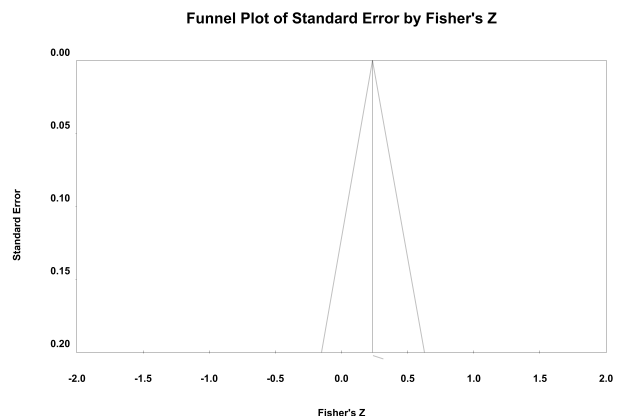
**Figure 2.** Funnel plot of positive parenting style and prosocial behavior



**Figure 3.** Funnel plot of negative parenting style and prosocial behavior



**Figure 4.** Funnel plot of positive parenting style and aggressive behavior



**Figure 5.** Funnel plot of negative parenting style and aggressive behavior



negative parenting style and aggressive behavior (The intercept = -1.14, 95%CI: [-5.89, 3.61]), indicating no publication bias [ $t(25) = 1.19$ ,  $P = 0.62$ ]. Thus, all of the publication bias indicated that there was no significant publication bias in the meta-analysis.

## 4. Discussion

The aim of this meta-analytic review was to systematically summarize and analyze scientific publications investigating the association between parenting style (positive and negative) and social behavior (prosocial and aggressive). The findings showed that the more positive the parenting style, the more prosocial behavior and the less aggressive behavior. The more negative the parenting style, the less prosocial and more aggressive. Parents who adopt positive parenting styles such as encouraging independence and emotional warmth show high responsiveness and demand, and they are very sensitive and enthusiastic to the needs of their children, and instruct children through verbal preaching and different behavioral responses to promote prosocial behavior and reduce aggressive behavior<sup>[12]</sup>. Parents who adopt autocratic, penalty-oriented, and other negative parenting styles have high requirements and expectations for their children. This kind of parents expect their children to obey orders unconditionally without any explanation, and give little feedback to their children's needs. As a result, these children have poor social ability, cannot think independently, and increase problem behaviors<sup>[12]</sup>. In addition, harsh parenting may hinder a child's social development, which in turn may disrupt the process of parent-child interaction, so that it affects prosociality<sup>[79]</sup>. This study also verified Bronfenbrenner's ecosystem theory that micro-systems including family, peers, and school have a direct impact on children's social behavior. Family is not only the starting point of children's socialization but also the basis of children's interaction with the external environment<sup>[10]</sup>.

There is only a low or moderate correlation between parenting style and social behavior, that is to say, the association between parenting style and these two kinds of social behavior is also related to other factors, such as peer association, parent-child association, family structure, social media and other external factors and children's temperament and other internal factors. Aggressive or violent media is associated with many negative outcomes, including an increase in aggressive behavior<sup>[80]</sup>. However, prosocial media; or prosocial content in media play a positive and even protective role for children<sup>[81-83]</sup>. There are also studies pointed out that people living in a single-parent or reorganized family structure often do not get enough love and concern, so they have negative mental states such as pessimism, suspicion, depression, isolation, and so on, leading to aggressive behaviors. And complete family structure can give children enough emotional experience, and prosocial behavior in a good psychological state of development<sup>[84]</sup>. There are also studies pointed out that an outgoing personality is associated with strong prosocial behavior, while anxiety and neuroticism are associated with aggressive behavior<sup>[85-86]</sup>. Overall, there is a correlation between parenting style and young children's social behavior, but the association is also related to many other factors.

Sex could not significantly moderate the association between parenting styles and social behaviors. The findings were consistent with some studies<sup>[30]</sup>. Girls have advantages in emotional perceptual recognition, infectious response, understanding expression, and affective empathic tendencies, boys consciously control or suppress emotional expression and empathy<sup>[87]</sup>. Positive emotional expression of parents has a significantly better promoting effect on the prosocial behavior of girls than boys. Conversely, strict and lack of warm parental interaction stimulate aggressive behavior or problem behavior in boys. However, with the development of

education level and the renewal of the education concept, parents of the young generation have gradually broken the traditional Chinese custom of preferring sons over daughters, and their parenting methods do not differ according to the gender of children, so there is no difference between parents' treatment of children of different genders.

The publication period could not significantly moderate the association between parenting style and social behavior, but could significantly moderate the association between negative parenting style and prosocial behavior, and the COVID-19 period was stronger than the development period. During the COVID-19 period, parents spend much more time with their children than before at home, so parent-child friction inevitably increases, which may lead to parents' frustration in parenting<sup>[88]</sup>. A Brazilian study also revealed that parents used physical coercion and verbal hostility to control their children's social behavior in pandemic situations, which makes it difficult for children to develop prosocial behaviors<sup>[89]</sup>. It is worth noting that the increase in parent-child conflict during the pandemic does not mean a change in parenting style. There is no significant change in the period of COVID-19 or non-COVID-19, which explains the research findings that the time of publication does not significantly affect parenting style and aggressive behavior of children. As for the result that parental rearing style and prosocial behavior of young children could not be significantly adjusted during the period of publication, this was inconsistent with the study of some studies<sup>[90]</sup>. They pointed out that during the epidemic period, most college students were actively engaged in various anti-epidemic actions closely related to society, which could easily lead to empathy and help support behavior, and young children because of their ability to participate in anti-epidemic activities, their social behavior can not change too much during the COVID-19 period. The study speculated that it might be caused by the group of subjects.

## 5. Limitations and implications

This study focuses on the close association between parenting style and prosocial and aggressive behaviors of preschool children. It also explores the child sex (female), and publication period (non-COVID-19 period/COVID-19 period) moderating the association between the two. It has important reference and guiding significance for promoting prosocial behavior, reducing aggressive behavior, and guiding family education in the new era. Shortcomings and prospects of this study: (1) In this study, most studies on parenting styles rely on reports provided by parents, while children's self-reports and experimental reports nominated by peers are less considered. Future studies can adopt peer nomination or experiments to explore children's social behaviors. (2) Since most of the included studies did not report age, and most of the subjects were mixed-age children, namely large, middle, and small classes, it was impossible to explore the close association between age and maternal parenting style and children's prosocial behavior and aggressive behavior. (3) In terms of the measurement tools of parenting styles, most studies have adopted the questionnaire of parenting styles or similar measurement tools, but few tools such as EMBU are involved. Future studies can be based on the Chinese cultural background and family education background in the new era to dig deeper and expand the measurement tools of parenting styles. (4) Most of the children included in this study are children with typical development, and there is little reference to children with difficulties such as left-behind children and mentally retarded children, who are the special "care" group of children and need to be given more care. The researchers hope that special children can be included in the study in the follow-up research, not just normal children.

## 6. Conclusion

Overall, the more positive the parenting style, the more prosocial behavior and the less aggressive behavior the child has. On the contrary, the more negative the parenting style, the less prosocial behavior and more aggressive behavior the child has. Additionally, negative parenting styles during the COVID-19 period significantly reduced the prosocial behavior of children. The findings suggest that parents should use as much positive parenting as possible while avoiding negative parenting, especially in closed environments such as the COVID-19 period.

## Disclosure statement

The authors declare no conflict of interest.

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# A Review on the Deep Integration of Culture and Tourism Promoted by Big Data

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**Abstract:** Under the background of the digital era, the development of deep integration of culture and tourism promoted by big data has attracted more and more attention from the academic circle. This paper reviews relevant literature on the deep integration of culture and tourism promoted by big data. This paper summarizes the main topics of related research from the aspects of the relationship speculation and internal logic of cultural tourism, the integrated development of the cultural tourism industry enabled by digital technology, and the application of big data to promote the deep integration of cultural tourism. Combined with the above development trends, this paper proposes the research prospect of promoting the deep integration of cultural tourism in the digital era from the aspects of basic concept research, research content, and research methods.

**Keywords:** Cultural and tourism integration; Culture and tourism; Big data

**Online publication:** January 23, 2025

## 1. Introduction

In the academic field of tourism, culture and tourism have always been the focus of academic discussion. From the 1980s, when Mr. Yu Guangyuan put forward “tourism is a cultural undertaking with a strong economy and strong cultural character”, to the current hypotheses such as “soul carrier theory”, “poetry and distance theory”, and “resource market theory”, all of them show the profound connotation of the integration of culture and tourism and reflect people’s longing for the beautiful tourism experience. The rapid development of the digital age provides a new development opportunity for the deep integration of culture and tourism. The pace of the integration of culture and tourism is accelerating and the field is expanding. The research topic of promoting the deep integration of culture and tourism with big data has attracted great attention from scholars. In line with the development trend of the digital age, this paper reviews and discusses the research progress of the deep integration of culture and tourism, and systematically summarizes the research perspectives, contents, and methods of the deep integration of culture and tourism promoted by big data, to provide reference for the relevant research on the integration of

culture and tourism, and provide decision-making reference for relevant departments in the aspects of digital culture and tourism and smart tourism.

## **2. Research topic of big data promoting the deep integration of culture and tourism**

### **2.1. Research on the speculation and internal logic of the relationship between culture and tourism**

In the 1980s, relevant scholars began to explore the relationship between culture and tourism, either regarding social culture as an important tourism resource or tourism itself as a kind of cultural life <sup>[1-2]</sup>. Culture is one of the main content providers of tourism experience, and tourism is one of the most important sources of income for cultural institutions. The inseparable relationship between culture and tourism has been recognized by the academic community, and the two are closely linked in practice through cultural tourism, a clear form of consumption <sup>[3-4]</sup>. With the deepening of research, relevant scholars have further deepened their understanding of cultural tourism from the aspects of cultural identity, region and field, and cultural space production. From the perspective of cultural identity, Zhang Zhaozhi proposed that the relationship between culture and tourism originates from individual tourists or the collective search for the cultural identity of a nation and a country <sup>[5]</sup>. Based on cultural identity, Fu Caiwu proposed that individual tourists promote the organic connection between culture and tourism at the peak of cultural identity through cultural travel consumption behavior <sup>[6]</sup>. Ma Yong et al. discussed the relationship between culture and tourism from the perspective of region and field and believed that inter-regional tourism flow is an important channel for cultural interaction and change, and cultural field is the spatial carrier of cultural and tourism integration, and tourism spatial carrier participates in the co-creation of cultural field <sup>[7]</sup>. However, Chen Yining and Li Gang put the integration of culture and tourism in a broader perspective of spatial production, pointing out that spatial production is the carrier of culture and tourism and the basis of collaborative development <sup>[8]</sup>. The understanding of the relationship between culture and tourism is a gradual deepening process, and the deep integration of cultural tourism is also a dynamic process. Cultural and tourism integration is not a simple combination of the two, but a deep integration in the fields of concept, function, industry, technology, and resources <sup>[9]</sup>. Among them, cultural heritage tourism, cultural and creative tourism, and cultural and tourism integration and innovation practice in ethnic areas have gradually become one of the highlights of local economic growth <sup>[10-12]</sup>. To achieve high-quality development of cultural and tourism integration, it is necessary to strengthen resource integration, promote product integration, strengthen channel integration, and explore institutional integration, to revitalize development and destination culture, to promote the transformation and upgrading, quality and efficiency improvement, and high-quality coordinated development of the two industries of culture and tourism <sup>[13-15]</sup>.

### **2.2. Research on the integrated development of cultural and tourism industry enabled by digital technology**

The core of cultural and tourism integration is the comprehensive and deep integration of the cultural industry and tourism industry, and the strong industrial correlation and coupling between the cultural industry and tourism industry provide an opportunity for their deep integration <sup>[16-17]</sup>. With the transformation and upgrading of digital technology, not only the new business forms of the cultural industry and tourism industry are booming, but also digital technologies represented by big data and blockchain provide new ideas and directions for the deep integration of the digital industry and cultural tourism industry <sup>[18]</sup>. It has also spawned many new formats and



models of the cultural tourism industry, such as smart tourism, digital creativity, digital art display, and immersive experience <sup>[19]</sup>. Digital technology has promoted profound changes in the industrial chain from the supply side and the demand side, which not only changes the cognition and behavior of the demand side, but also changes the production and delivery mode of the supply side, and improves the efficiency of public services while improving administrative supervision methods <sup>[20–21]</sup>. To explore a new path for the integrated development of the digital cultural and tourism industry, it is still necessary to solve the problem of “supply and demand mismatch” <sup>[22]</sup>. On the supply side, it is necessary to take “content construction” as the core, achieve the coordination of digital technology and innovation, and ensure the supply of high-quality products and the improvement of the industrial chain. On the demand side, with “experience is king” as the development orientation, improve the immersive experience of digital cultural travel products. At the regulatory level, improve the laws, regulations, and policy system supporting the integration, coordination, and innovative development of the digital cultural and tourism industry <sup>[23]</sup>.

### **2.3. Research on applying big data to promote the deep integration of culture and tourism**

Big data is the theoretical support for the integrated development of culture and tourism, as well as the practical path. Big data technology, which enables innovation, constantly stimulates independent research and development and commercial innovation in the field of culture and tourism and becomes a realistic breakthrough in the integration of culture and tourism <sup>[24]</sup>. For example, the prediction of tourist volume based on Internet tourism data, the perception of tourism image based on Internet big data, and the efficient application of tourism big data in tourism crisis management are all effective ways for universities to fully utilize big data to promote the high-quality development of tourism <sup>[25–27]</sup>. However, in promoting the integrated development of culture and tourism, big data still faces problems such as a large urban-rural digital divide, prominent data island phenomenon, urgent need to strengthen tourism data security and privacy information protection, and lack of unified and standardized tourism information management platform <sup>[28–29]</sup>. Faced with these severe practical challenges, it is necessary to accelerate the improvement of the construction of big data platforms. Build a data sharing and collaboration mechanism for the tourism industry at the levels of enterprises, industries, departments, and regions, crack the phenomenon of data silos, and consolidate the foundation for the development of big data for cultural tourism <sup>[30]</sup>.

### **2.4. Research review**

The current academic research results have provided a good preliminary foundation and theoretical support in terms of speculation and internal logic of the relationship between culture and tourism, digital technology enabling the integration of cultural and tourism industries, and the application of big data to promote the integration of cultural and tourism development. First, the academic community has discussed the mutual relationship between culture and tourism from different perspectives and conducted extensive discussions on the internal logic and integration value of cultural and tourism integration. Second, digital technology enabling cultural and tourism integration has attracted wide attention from the academic circle. The development direction of cultural and tourism industry integration has been deeply discussed not only from the theoretical level but also from the application level. Third, the academic community explored the role and effectiveness of big data in promoting the integrated development of culture and tourism and carried out a detailed analysis of the shortcomings of big data applications.

However, the research on big data to promote the deep integration of culture and tourism still needs to be

further expanded. First, the theoretical logic of big data to promote the deep integration of culture and tourism still needs to be further elaborated. Second, there are few research results on how big data can promote the deep integration of culture and tourism, and no systematic explanation has been given on how to solve the mismatch between the supply and demand of cultural tourism based on big data in practical operation. Third, how to design the path system to ensure the high-quality development of deep integration of culture and tourism enabled by big data is a key issue that needs new thinking at this stage.

### **3. Research implications and prospects**

Big data to promote the deep integration of culture and tourism is an inevitable requirement for the development of the digital era, and a new driving force to promote the high-quality development of cultural tourism. By reviewing and discussing the research progress of big data to promote the deep integration of culture and tourism, this paper finds that there are still some research deficiencies, and puts forward the following suggestions.

First, in terms of basic research, researchers should pay attention to the basic research of concepts and theories. A deep understanding of the connotation of the deep integration of culture and tourism and the theoretical logic of the deep integration of culture and tourism is the basis and premise for the academic circle to research the deep integration of culture and tourism. At the same time, because different scholars are facing different countries and national conditions, there are some differences in the basic definition of culture and tourism. Therefore, the academic community should pay attention to the research of basic theories and the analysis of basic concepts, and reach a unified and standard scientific definition as soon as possible, to enhance the academic value and authority of research results in culture and tourism.

Second, in terms of research methods, the research methods adopted by scholars should be mixed and diversified, and the research vision should be diverse and global. Tourism is a comprehensive subject, with the characteristics of interdisciplinary, in the process of research, psychology, geography, anthropology, sociology, and other disciplines can be integrated into tourism. Therefore, in the process of studying the deep integration of culture and tourism promoted by big data, diversified research perspectives and research methods should be adopted, and mixed research methods combining qualitative and quantitative methods should be used, to break the existing research bottleneck and find a breakthrough point in the research of cultural and tourism integration.

Third, in terms of research content, the research on promoting the deep integration of culture and tourism with big data needs to focus on solving the problem of data barriers in the traditional cultural and tourism industry. By building a big data platform, the flow of data elements in the cultural and tourism industry can be smooth and the dilemma of “data island” can be solved. At the same time, how to enhance the actual value and application space of big data technology in the cultural and tourism industry is also worth further exploration. In addition, it can also conduct multidimensional analysis and summary of typical cases of deep integration of culture and tourism promoted by big data, to provide reference and reference for the deep integration of culture and tourism to achieve high-quality development.

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# A Review of Research on Corporate Social Responsibility

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**Abstract:** With the progress of society and the continuous updating of people's concepts, enterprises are no longer simply profit-oriented, and should also need to assume certain social responsibilities. The concept of corporate social responsibility is beginning to be recognized and valued by the public, and the importance of fulfilling corporate social responsibility is becoming increasingly prominent. Fulfilling corporate social responsibility helps to establish a good brand image and corporate image, improve employee happiness, and enhance work enthusiasm. It is regarded as one of the core competitiveness of enterprises and an important measure to maintain social stability and sustainable development. Actively fulfilling social responsibility, assuming its economic, social, and environmental responsibilities, and meeting the demands of various stakeholders can help improve the reputation and credibility of the enterprise, increase consumer support and trust, and thus be more likely to receive positive attention and external investment. It can establish a good corporate image in major transaction decisions and expand the probability and quantity of successful transactions.

**Keywords:** Corporate social responsibility; Influencing factors; Consequences of fulfillment

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## 1. Introduction

The report of the 20th National Congress of the Communist Party of China pointed out that “high-quality development is the primary task of comprehensively building a socialist modernized country.” Corporate social responsibility is closely related to social stability, economic development, and people's happiness. By promoting high-quality development, enterprises can fulfill their social, economic, and environmental responsibilities, accelerate the construction of a modern economic system, and focus on effectively improving the quality and quantity of China's economy. Actively fulfilling social responsibility is the key for enterprises to enhance market value, improve product competitiveness, and achieve long-term success. To ensure lasting vitality and new competitiveness, enterprises need to make efforts to improve quality, enhance production and operation efficiency, and actively assume social responsibility to cope with sudden market shocks and promote long-term development.



Therefore, studying the fulfillment of corporate social responsibility is of great significance and is a beneficial exploration to achieve the common promotion of the economic and social interests of enterprises.

Realizing sustainable economic development is one of the goals of building a harmonious society today. To achieve a better future, the survival and development of companies cannot be separated from fulfilling various social responsibilities. Fulfilling social responsibilities has become an action level for enterprises. Fulfilling social responsibility by enterprises can improve innovation output and enhance innovation efficiency; Relieve constraints, reduce bond financing costs, and lower the likelihood of companies falling into financial difficulties; Promote the improvement of enterprise performance, accounting performance, market performance, etc. How to effectively fulfill corporate social responsibility and achieve coordinated development of the environment, economy, and society is an important focus of current academia and government. Many scholars have shifted their research focus to exploring corporate social responsibility.

## **2. Concept and connotation of corporate social responsibility**

Since the concept of Corporate Social Responsibility (CSR) was proposed at the beginning of the last century, scholars from various fields have conducted in-depth research on it. American scholar Oliver Sheldon first proposed the concept of corporate social responsibility in 1942. He linked the responsibility of corporate managers to meet the needs of others with corporate social responsibility and proposed that ethical factors should be taken into consideration. Subsequently, Bowen defined corporate social responsibility in 1953 as the social responsibility of the operator, which refers to the obligation of the operator to formulate policies, make decisions, and take actions based on social standards and values. In 1979, Carroll proposed that corporate social responsibility refers to the expectations of a company towards an organization at a certain point in time, including economic expectations, legal expectations, ethical expectations, and freedom of action expectations. In 1962, Ferry first proposed the concept of Corporate Social Irresponsibility (CSI), which Lange and Washburn defined as “acting in an irresponsible manner” and viewed as the opposite of CSR<sup>[1-2]</sup>. Jingchen Ma and Xu Huang believe that while companies “do bad things” through CSI, they also “do good things” through corporate responsibility behavior (CSR), and the combination of these two constitutes corporate social performance (CSP)<sup>[3]</sup>. Some scholars believe that CSR refers to corporate behavior that can have a positive impact on society, while CSI refers to corporate behavior that causes significant losses or harm. CSI and CSR are both related and independent, which means they can coexist in the enterprise. Mattingly, Berman’s research found that CSR and CSI have different structures both empirically and conceptually, and should not be mixed into a single overall social performance indicator in future research<sup>[4]</sup>. However, in some previous studies, the definition of CSR was not clear enough, and “doing good things” and “doing bad things” were generally included in CSR. Due to the complexity of the enterprise value creation process, enterprises may simultaneously “do good things” and “do bad things.” Similarly, some literature implicitly expresses the view that “as long as a company does not do bad things, it fulfills its social responsibility” in expression analysis, but this view is not comprehensive because not doing bad things and doing good things are two different levels of issues, and not doing bad things does not mean doing good things. “Doing good things” and “doing bad things” are different ways of behavior for enterprises. Confusing them can easily lead to a “good and bad offset” of corporate social behavior, which can result in the masking of the impact of “doing bad things” on enterprises and the inability to further explore the different economic consequences of the two types of social behavior. Corporate social responsibility requires companies to take the bottom line of not doing bad things and

doing good things within their capabilities.

### **3. Factors influencing corporate social responsibility**

#### **3.1. Management characteristics**

Jiang Yaoming and Lai Yan found that the overseas background of executives is positively correlated with the disclosure of corporate social responsibility information. In addition, compared with the overseas learning background of executives, the overseas work background of executives has a stronger effect on improving the quality of corporate social responsibility information disclosure <sup>[5]</sup>. Tang et al. explored the relationship between CEO arrogance and corporate social responsibility and found that CEO arrogance is negatively correlated with a company's social responsibility activities, but positively correlated with its lack of social responsibility <sup>[6]</sup>. Jiang Jialin et al. explored the impact and boundary conditions of CEO-educated youth experience on corporate social responsibility based on imprint theory and higher-order theory. The study found that CEO-educated youth experience will encourage companies to take on more social responsibility <sup>[7]</sup>.

#### **3.2. Internal management of the company**

Zhang Dongxu et al. found that executive equity incentives can promote corporate social responsibility, as evidenced by higher scores in corporate social responsibility among samples implementing equity incentives <sup>[8]</sup>. Wang Zhihao et al. found that the investment period of institutional investors is positively correlated with the social responsibility performance of private enterprises. Long-term institutional investor shareholding has a promoting effect on the improvement of corporate social responsibility performance, while short-term institutional investor shareholding has a negative impact on corporate social responsibility performance <sup>[9]</sup>.

#### **3.3. External factors such as environment and policies**

Research by Zhu Han et al. found that the government's mandatory CSR requirements may help companies break free from the prisoner's dilemma, thereby enabling them to obtain higher profits. Quantifying the level of corporate CSR efforts can effectively prevent companies from engaging in CSR violations <sup>[10]</sup>. Zhu Naiping et al. found that tax incentives have an incentive effect on the comprehensive fulfillment of corporate social responsibility, promoting better fulfillment of social responsibilities such as shareholder responsibility, environmental responsibility, employee responsibility, and social public responsibility <sup>[11]</sup>. Wei Yuanying and Hu Chuan found that market-oriented policies and administrative policies have a significant positive impact on corporate social responsibility <sup>[12]</sup>.

### **4. The consequences of fulfilling corporate social responsibility**

#### **4.1. Improve innovation output**

Wang Haihua et al. found that corporate social responsibility has a significant positive impact on innovation, and the relationship between the two is moderated by cultural background, enterprise size, subjective and objective measurement methods, and innovation input-output measurement methods <sup>[13]</sup>. Chen Sijie and Geng Xianhui found that good corporate social responsibility performance promotes the improvement of collaborative innovation performance, and this effect is more significant in companies that voluntarily disclose social responsibility information. When industry competition is more intense and marketization is higher, corporate social responsibility

has a better promoting effect on collaborative innovation performance <sup>[14]</sup>. Song Yan and Xu Ying found that the social responsibility of platform enterprises has a significant promoting effect on corporate innovation. Their fulfillment of social responsibility not only has a significant impact on the effectiveness of corporate innovation but also can improve the efficiency of corporate innovation <sup>[15]</sup>. Research by Ran Rong et al. found that good corporate social responsibility can significantly promote green technology innovation output by providing more redundant resources <sup>[16]</sup>.

## **4.2. Relieve restrictive factors**

Xu Liping et al. found that the better the corporate social responsibility, the significantly lower the cost of bond financing, and the more severe the lack of corporate social responsibility, the significantly higher the cost of bond financing <sup>[17]</sup>. Zhang Zhenghua et al. found that corporate social responsibility can effectively suppress inefficient investment and alleviate financing constraints based on information asymmetry theory and agency theory <sup>[18]</sup>. Yan Wu and Kong Wen found that higher social responsibility performance can gain the support of creditors and customers, reduce the financing costs of enterprises, improve their bargaining power, and thus reduce the possibility of enterprises falling into financial difficulties <sup>[19]</sup>.

## **4.3. Enhancing advantages and performance**

Xu Liping et al. found that CSR promotes corporate performance, CSI suppresses corporate performance, but CSI enhances the promoting effect of CSR on corporate performance <sup>[20]</sup>. Feng Liyan et al. found that actively fulfilling social responsibility can improve the speed of dynamic adjustment of corporate capital structure, and the above results are more significant in over-indebted enterprises, non-state-owned enterprises, and heavily polluting enterprises when undertaking social responsibility. The alleviation of financing constraints and improvement of the information environment are the inherent mechanisms by which corporate social responsibility affects the dynamic adjustment of capital structure <sup>[21]</sup>. Zhu Danyang and Li Xuhong found that corporate social responsibility investment has a positive effect on both accounting performance and market performance, that is, the net profit and stock price of the enterprise will recover faster. Among them, the recovery effect of government responsibility investment and social responsibility investment on net profit is greater than that on stock price <sup>[22]</sup>.

## **5. Review and prospect**

Through the review of relevant literature on corporate social responsibility, it is found that the fulfillment of corporate social responsibility has a profound impact on enterprises in multiple aspects. Firstly, the practice of corporate social responsibility can significantly enhance a company's innovation capability and output, by enhancing its reputation and attracting resources, promoting collaborative innovation and green technology innovation, especially in industries with high marketization and fierce competition. Secondly, corporate social responsibility can help alleviate financing constraints and inefficient investment problems for enterprises. Good social responsibility performance can reduce bond financing costs and enhance the bargaining power and market trust of enterprises, thereby reducing the possibility of falling into financial difficulties. Finally, corporate social responsibility has a significant impact on improving corporate performance, not only promoting the recovery of net profits and stock prices but also accelerating the dynamic adjustment of corporate capital structure by improving the information environment and alleviating financing constraints, especially in over-indebted enterprises and heavily polluting industries.

## Disclosure statement

The author declares no conflict of interest.

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# Emotional Exhaustion as a Mediator between Emotional Labor and Work-to-Family Conflict

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**Abstract:** In clinical work, nurses need to pay not only physical and mental labor but also emotional labor. This study recruited 163 nurses from 5 hospitals in China as the research object. Based on COR theory, this study aimed to explore the relationships between nurses' emotional labor strategies, emotional exhaustion, and work-to-family conflict. Findings show that surface acting is indirectly related to work-to-family conflict via emotional exhaustion. While deep acting was unrelated to emotional exhaustion and work-to-family conflict. The results of this study enrich the literature on emotional labor and provide some suggestions to balance work-family conflict for nurses.

**Keywords:** Emotional labor; Emotional exhaustion; Work-to-family conflict

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## 1. Introduction

In recent years, emotional labor has been an important topic among nurses. Studies have shown that emotional labor is a crucial aspect of healthcare workers<sup>[1]</sup>. Nurses need to pay not only physical and mental labor but also emotional labor. Although emotional labor can promote nurses' clinical work and help to harmonize interpersonal relationships, inappropriate emotional labor strategies will result in turnover intention, job dissatisfaction, burnout, and poor mental health<sup>[2-3]</sup>.

Emotional labor refers to employees managing or changing their emotions at work to meet the requirements of the organization, which has usually been conceptualized in two strategies to manage or modify emotion to express the desired emotion which were defined as surface acting and deep acting<sup>[4]</sup>. Existing research shows that employees who experience surface acting may be forced to devote more resources to their work, which can lead to harmful results, such as job dissatisfaction, health problem as well as burnout<sup>[5-7]</sup>. According to the Conservation of Resources theory (COR theory), surface behavior consumes too much energy and the negative organizational results caused by surface behavior cannot be used as a supplement to employees' resources<sup>[8]</sup>. Thus, when employees consider both work and family roles, resources will be lost, resulting in work-family conflict. Previous research indicated that deep-

acting requires little energy resources, and it is less likely than surface-acting to be associated with resource loss. Moreover, it has been postulated that deep acting could replenish an individual's resources by increasing professional efficacy and job satisfaction <sup>[3, 7]</sup>. Based on COR theory, deep acting allows nurses to have enough energy and emotional resources to participate in family life. Thus, the following is proposed.

Hypothesis 1a: Surface acting is positively correlated with work-to-family conflict.

Hypothesis 1b: Deep acting is negatively correlated with work-to-family conflict.

Early evidence suggests that emotional labor can result in work-to-family conflict <sup>[9–10]</sup>. However, the process of emotional labor leads to work-to-family conflict is less clear. According to COR theory, to expend fewer resources at work, employees are motivated to retain, protect, and maintain valuable resources. When their resources are actually lost, they will feel anxiety and pain, eventually leading to exhaustion and health problems. Emotional exhaustion at work leads to employees' insufficient emotional resources to meet the requirements of their families. Therefore, this study proposes that emotional labor can affect work-family conflict through emotional exhaustion.

Hypothesis 2a: Emotional exhaustion partially mediates between surface acting and work-to-family conflict.

Hypothesis 2b: Emotional exhaustion partially mediates between deep acting and work-to-family conflict.

## **2. Method**

### **2.1. Participants and procedure**

The subjects were nurses from 5 hospitals in China. The nurses completed measures of emotional labor and emotional exhaustion at work, while nurses' families rated their work-to-family conflict. All subjects participated anonymously and voluntarily. In total, 225 matching questionnaires for nurses and their families were distributed, and 163 valid matching questionnaires were returned for analysis, representing a 72% response rate. For nurses, married participants accounted for 70% of the sample, there were 150 females, and 13 males, and the modal age was 20–29 years for nurses. For the nurse's family who complete the matching questionnaire, spouses account for 70%, parents account for 20%, and siblings account for 10%.

### **2.2. Measures**

The emotional labor scale consists of two subscales <sup>[11]</sup>. The surface acting dimension includes seven items ( $\alpha=.79$ ), and the deep acting dimension includes four items ( $\alpha=.72$ ). The questionnaire was scored with five points, measured in the range of 1 (strongly disagree) to 5 (strongly agree).

Emotional exhaustion was measured by the well-validated Dutch version of the Maslach Burnout Inventory <sup>[12]</sup>. In this research, the researchers used the Chinese translation of the emotional exhaustion scale from Li <sup>[13]</sup>. The questionnaire was scored with six points, measured in the range of 0 (never) to 6 (always, daily) ( $\alpha=.86$ ).

Work family conflict scale includes two subscales: The work conflict with the family subscale and the family conflict with work subscale <sup>[14]</sup>. This study adopts a work-to-family subscale. The questionnaire was scored with five points, measured in the range of 1 (strongly disagree) to 5 (strongly agree) scale ( $\alpha=.87$ ).

### **2.3. Data analysis**

Descriptive statistics for the major study variables, Cronbach alpha reliability estimations, and corrections were conducted using the SPSS (version 26.0). Studies have shown that structural equation modeling can be used as a better method to test the mediation hypotheses. Therefore, this study used structural equation modeling to test the

mediation role of emotional exhaustion by using Lisrel 10.1.

### 3. Results

#### 3.1. Correlations assessment

**Table 1** shows the means, SDs, and the correlations among the research variables. The data show that hypothesis 1 was partially supported. Nurses who performed surface acting reported stronger positive work-to-family conflict ( $r=.289$ ,  $P<.01$ ). While deep acting was unrelated to work-to-family conflict. Thus, Hypothesis H1a was supported, but H1b was not supported.

**Table 1.** Correlation table ( $n=163$ )

Measure	1	2	3	4
1. Surface acting				
2. Deep acting	.254			
3. Emotional exhaustion	.221**	-.088		
4. Work-to-family conflict	.289**	.050	.495**	
Means	2.90	3.59	3.05	3.40
SD	.66	.64	1.59	.83

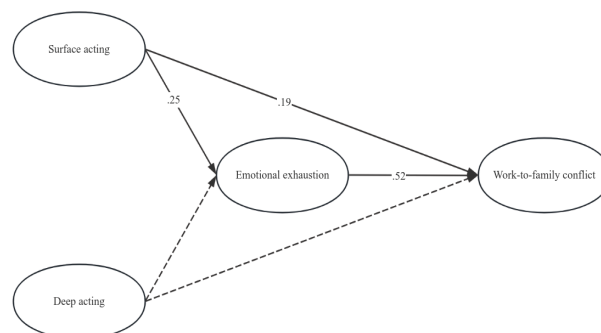
\* $P<.05$  \*\* $P<.01$

#### 3.2. Mediating effects of emotional exhaustion

Following Iacobucci et al.'s research, the study fit a structural model containing both direct and indirect paths <sup>[15]</sup>. The goodness of fit statistics are as follows:  $\chi^2$  (222) = 525.16, RMSEA = 0.091, NFI = 0.80, NNFI = 0.86, CFI = 0.87, IFI = 0.88, GFI = 0.80.

**Figure 1** shows the direct path between surface acting and work-to-family conflict was significant:  $\beta_{\text{surface acting} \rightarrow \text{work-to-family conflict}} = .25$ ,  $P<.05$ ; the mediation paths both from surface acting to emotional exhaustion and from emotional exhaustion to work-to-family conflict were significant:  $\beta_{\text{surface acting} \rightarrow \text{emotional exhaustion}} = .19$ ,  $P<.05$ ;  $\beta_{\text{emotional exhaustion} \rightarrow \text{work-to-family conflict}} = .52$ ,  $P<.01$ . Consequently, the study concluded that emotional exhaustion partially mediates between surface acting and work-to-family conflict. Thus, Hypothesis H2a is supported.

The model shows that both the direct and indirect paths between the deep acting and the work-to-family conflict were not significant. Thus, Hypothesis H2b was not supported.



**Figure 1.** Estimated structural model

## 4. Discussion

Previous studies found a significant negative correlation between surface acting and work-to-family conflict in preschool teachers and service employees<sup>[16]</sup>. This study took nurses as the research object and found that nurses who performed more surface acting resulted in more work-to-family conflict. According to COR theory, nurses only change their external performance when they perform surface acting, and the internal real feelings are seriously inconsistent with the external expression. Such inconsistencies will deplete emotional resources, which makes nurses unable to have enough resources to participate in family life, resulting in work-to-family conflict. Thus, it can be seen that the impact of emotional labor on employees is not only in the work domain but also extended to the family.

Inconsistent with previous research, this study found that deep acting was not corrected with work-to-family conflict<sup>[16]</sup>. The possible reason is that the emotional labor strategies of nurses at work are more complex. They need to take care of patients and comfort the patients' families, which would consume emotional resources. If nurses perform deep acting, which improves the expression level of their true feelings by adjusting strategies, they can get more positive feedback from patients and their families or organizations. Such feedback can be used as a kind of resource compensation to help nurses restore or regain important resources.

According to the findings of this study, the researchers suggest that nurses should learn to internalize their role as nurses, and reduce disguising or hiding their real emotions. At the same time, nurses should learn to empathize with patients in clinical work, which helps them use a more deep-acting strategy. For the organization, they should provide more material or spiritual rewards as a supplement to the energy loss of nurses. The organization shall also carry out emotional labor strategy training, which helps nurses use better emotional labor strategies and promote nurses' mental health and family harmony.

## Disclosure statement

The author declares no conflict of interest.

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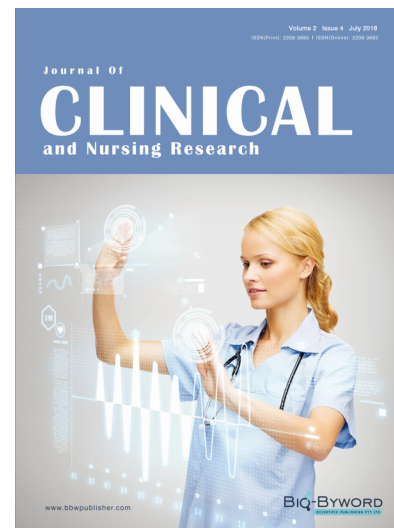
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